UNION OF SOUTH AFRICA

DEPARTMENT OF AGRICULTURE

THE

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OF THE

# UNION OF SOUTH AFRICA



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# The Agricultural Journal

## OF THE UNION OF SOUTH AFRICA.

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## Editorial Notes.

While, of course, there is much the farmer can learn only by experience, there are many things essential to his success that the mere performance of the necessary farm operations will not teach him. Spreading manure will never teach him that stable manure should be supplemented with phosphoric acid to get the best results. The growing of clover will not teach him that mineral fertilizer may keep up the fertility of the soil where clover grows luxuriantly and occurs in the rotation at definite intervals. Feeding cattle will not teach him that a good ration for milch cows is one containing one pound of digestible protein to seven pounds of digestible carbohydrates, provided it is palatable and at least two-thirds of the total ration is digestible. Nor will the feeding of such a ration teach the farmer how to calculate the most economical ration from feeding stuffs at current prices.—THOMAS F. HUNT.

### Our Live Stock Importations.

Readers of the *Journal* who regularly scan the concluding pages of miscellaneous matter in each issue will be familiar with the live stock import returns that have now become a regular feature. The returns themselves are concise, matter-of-fact, and contain nothing that will strike the eye of the merely superficial reader. But critical observers must have become impressed by two very significant facts, namely, the insistence with which the returns appear and the class of stock whose importation they record. And there is another interesting fact which this monthly statement records: that is, the general dispersal of these pure-bred animals over the Union.

We commend these monthly returns to the careful attention of all interested in the agricultural progress of this country. They are an index well worth studying—an index of our progress. Certainly they cannot be regarded as indicating more or less statistically the strides we are making, but they serve to show the tendencies of our time and speak with promise of the future of live stock farming.

When we study these returns every month, and, at the same time, observe the constant references in the South African and oversea Press

to the purchases of pedigree stock that our farmers are making, we cannot help feeling that we are at the dawn of a great awakening in regard to our live stock industry. We must realize, of course, that the granting of free freight for pedigree stock by the Union-Castle Steamship Company, in accordance with the mail contract, is having a great deal to do with the present extensive imports of animals, but, at the same time, not all the most liberal freight conditions in the world will introduce stock into a country unless there is the necessary response on the part of farmers, the response born of a progressive spirit. Nor even is the existence of a progressive spirit sufficient; we have quite our meed of stock diseases in this country, and we require a dogged perseverance in the face of past ill-luck and the fullest confidence in the future adequately to respond to the offer of free freight. That such a spirit of determination and confidence exists is surely evidenced by the import returns to which we have referred.

**Good Out of Evil.**

We may go still further and point to another line of progress which the present extensive and steady importation of live stock indicates. We have in this country certain diseases which are epizootic, e.g. East Coast fever, a tick-borne disease. Other diseases are enzootic, as, for example, redwater, which is also tick-conveyed. There was a time when the importation of pure-bred cattle, for example, was attended by grave risks on account of the presence of redwater. The cattle had to be carefully "acclimatized"—which simply amounted to their immunization against redwater—and the dangers of loss were great, in spite of every care. The introduction of the practice of dipping has worked a revolution in the cattle industry, and its most patent effects are to be observed in the wonderful growth that has taken place in dairying during the past few years. If we disregard the influence of the ostrich industry on land values, particularly in the Oudtshoorn District, in probably no other branch of farming has such a wonderful change come over the face of rural affairs as has been experienced in connection with the cattle industry. Ten years ago the tick was the terror of the South African cattle owner. To-day he is still the terror of many—yet needlessly so—but by all progressive farmers he is looked upon, as he should be, as perhaps a necessary denizen of the veld, yet as one that is now incapable of proving the dreaded scourge of the cattle farmer that he once was.

Shakespeare has, in *Henry V.*, a line that has always appealed to us. It is one of those hundreds of lines that you will find scattered all through his works embodying the elements of a practical, everyday philosophy of universal application:—

"There is some soul of goodness in things evil."

In our private life we have seen the truth of this axiom borne out again and again, and it is an axiom that seems to be applicable to farming equally as it is applicable to all spheres of human activity. When we saw what eventually proved to be a terrible scourge to Natal, as it also did to the Transvaal—East Coast fever—loom over the Natal horizon, cross the Tugela River in 1906, and sweep through the Province, we, with many another, regarded it as an unmixed evil. The future, as far into the distance as we could see, appeared to be

clouded, overhung by this terrible scourge. We studied carefully the disease and the situation, and listened to the opinions of representative farmers at meetings of the Natal Agricultural Union, and for a long time no hopeful light could be seen in the dark future.

**The Value of Dipping.**

To-day, in 1913, we write with our eyes opened, with the truth of Shakespeare's dictum once more made manifest to us: "There is some soul of goodness in things evil." What has been the result? Let us take Natal, again, as one of the two Provinces that has suffered terrible damage at the hands of East Coast fever. What happened? Two pioneers in thought arose—as has already been observed in these pages—the Honourable Joseph Baynes, of Nels Rust, and Mr. H. Watkins Pitchford, the Government Bacteriologist. These gentlemen between them—the one practically, the other scientifically—demonstrated the value of dipping in the eradication of the tick. Yet, before their fine work came to be recognized, there was, strange as it may seem, a deal of adverse opinion to be overcome and put right as to the part played by the tick in the transmission of East Coast fever. Then the faith in dipping began to grow. And what is the position to-day in Natal? From end to end of the Province you will find whole-hearted adherents to the practice—men who will swear by dipping, not only as a means of dealing with East Coast fever, but as the necessary means of keeping down the tick, the host of redwater and several other diseases, and the reducer of the condition of cattle.

"In the old days we used to feed—not cattle, but ticks," an enthusiastic Natal supporter of dipping has said; and in many parts of South Africa farmers are still feeding ticks. Thereby hangs the trouble with which many a farmer has been faced in the past. The veld has been obliged to yield a livelihood not only to the ox but to the tick as well, and the results may be imagined.

It is when we consider the matter from this aspect that we begin to realize something of what has been done for the country by the introduction of the periodical dip. The full value of the practice is only known practically in Natal, in portions of the Transvaal, and in the Transkeian Territories. Yet the lessons which have been learned in these countries are being taken to heart elsewhere in the Union, and it is safe to say that a strong prejudice in favour of regular dipping is gradually overtaking the whole of the sub-continent. What does this mean? What does this invasion of the progressive spirit portend? It simply means this that the day is surely coming when such enzootic diseases as redwater will be laughed at instead of being feared. Their adverse influence upon the cattle industry is passing. And as with redwater so with other tick-borne diseases. Their influence is waning. They are no longer regarded as the bugbear of the farmer. Dipping —periodically in an efficient fluid—is reducing them to the point at which they are no longer potent factors adversely affecting the progress of the live stock industry.

**Confidence in our Future.**

What, then, is the lesson we have learned in the light of Shakespeare's maxim? It is simply this: that, so far as the once

terrible scourge of East Coast fever is concerned, its incidence has brought out and demonstrated the advantages of periodical dipping, and our lesson has conveyed to us not only the value of dipping for epizootic but also for enzootic tick-borne diseases, whilst, in addition, we have learned that the destruction of the tick has been attended by a greater degree of healthfulness on the part of our live stock on account of the blood-sucking propensities of this parasite. The tick has been responsible in the past for a very great deal of the lessened vitality of cattle, for it stands to reason that the greater the tick-infestation the more will the vitality of the cattle be diminished. And so with the introduction of the periodical dip, not only are tick-borne diseases succumbing, but the general health of our cattle is steadily improving. Observe, too, the situation that has been created; as our import returns show, pedigree cattle are being introduced into the country, even into the once tick-ridden Province of Natal, fearlessly and confidently.

We have confined ourselves exclusively to cattle in dealing with the significance of the import returns, and we have done so because the change which has been wrought by the introduction of dipping has been more striking than any change observable in other branches of the live stock industry. Pedigree sheep are introduced in spite of the existence of scab, but it is now many years since farmers first realized that scab could be kept under control by dipping, and every farmer nowadays who is sufficiently progressive to import good stud rams is likewise sufficiently progressive to take the necessary steps to keep his farm clean. But in the case of cattle the situation has been different, as we have described, and it is only now that farmers in tick-infested parts of the country are sufficiently confident to expend considerable sums in the purchase of pedigree cattle.

These are some of the signs that are writ in characters large enough for every thoughtful observer to read; signs of an awakening, indications of the great future that lies before the live stock industry of South Africa. Our country has immense potentialities, and it is gratifying to observe that they are now coming to be more generally recognized. Our farmers have had some hard battles to fight with adverse circumstances, but they are coming through with the added strength and confidence that victory bestows.

**An Example of Perseverance.**

We had written the foregoing when we paid a visit to Pietersburg to attend the local agricultural society's annual show, and in that district we found a concrete illustration of the truth of our concluding observation in the above note. Mr. Hunt, in formally opening the show, described the Zoutpansberg, not as a district, but as a country. He said it was more than a district. And truly its area is sufficiently great and its individuality sufficiently distinctive to admit of the wider description. Pietersburg is the capital of this stretch of country, and in the future of the Zoutpansberg are its own fortunes bound up. For it is typical of the many little towns to be found scattered over the Union that rely for their existence and growth upon the agricultural prosperity of the district. Progress in farming means the progress of the town, and you see this exemplified everywhere in the close bond that is evident between townsman and farmer, a bond that

is necessarily not so readily observed in the larger towns where the ultimate dependence of commerce upon the industries connected with the land is more liable to be overlooked. And in Pietersburg this bond has been strengthened by the vicissitudes which the town has shared with the district. The farmers in the Zoutpansberg country have had great hardships to face. Anywhere from four to five hundred miles away to the south the Zoutpansberg farmers will find their past troubles sympathized with in the heart-felt way that only suffering shared will fully bring about, for, like Natal, the district has been swept from end to end by East Coast fever; the herds have been denuded, wiped out, and the farmers have been faced with the necessity of making a fresh start. The district is now clean, and everywhere you will find unbounded confidence in its future and determination to retrieve the past and profit by the lessons of adversity. This is the proper spirit for the farmer. Out of ~~the evil he learns to~~ extract the good, and in the degree that he does this is his future progress rapid or slow.

What the Zoutpansberg farmers are doing is well indicated by the Pietersburg show, and the witnessing of two successive shows, as we have done, offers interesting data from which to gauge the progress of the district. That progress has been made, even since last year, was fully patent to every one who attended this year's exhibition. Certainly the cattle, for example, were not first class on the whole, but no one expected them to be. It was sufficient that both their numbers and their quality should show an improvement upon last year, and this was the case. The improvement indicates progress and confidence, and we feel sure that this improvement will be maintained in future years. In the sheep section—which, by the way, was reasonably well filled, everything considered—there were some quite good animals, and on the other hand, some bad ones that should never have been sent to the showyard; yet, on the whole, the section was an improvement on last year. Goats were there in fair numbers, but pigs were practically a negligible quantity. An interesting feature of the show was the general hall where industrial, produce, home manufactures, and other perishable exhibits were housed. The produce showed up well and afforded a good indication of the possibilities of the district. Citrus fruits, too, were well represented and of good quantity. In most lines, indeed, a distinct improvement upon last year's exhibition was in evidence, whilst the arrangements in connection with the show appeared to give general satisfaction and reflected credit upon the energetic and hard-working secretary, Mr. Van Rooyen.

**The Place of the Country Show.**

Pietersburg show is a typical country exhibition, typical of the many shows held every year in the veld towns throughout the Union. These shows do not aspire to rival the great exhibitions at Rosebank, Port Elizabeth, Johannesburg, Bloemfontein, and Durban; those are the standard shows of the country; they apply to no particular district but invite and secure competition from all parts of the Union. Their true character, whilst similar in nature to that of the country shows, differs in degree and scope. The big shows set a standard for the whole country; the country shows set a standard for the district. At

the former the best stuff in the Union competes; at the latter it is the best in the district that is attracted. And so much less ambitious though the local show may be, it has nevertheless an important part to play, a useful, indeed necessary, function to perform in building up the agriculture of the district. The country show may be said to consolidate rural advancement. It serves as an annual rendezvous of agricultural interests. By exhibiting the best it exemplifies what the district is capable of producing; and, more than that, it serves as an educational factor of no mean importance. Then we have this to remember, that the country show performs a function that the national show cannot be expected in the nature of things to perform, in that it gives the beginner a chance—by which we mean the man who is either a beginner in farming or who is endeavouring to get out of the satisfied rut and produce better stock and better produce. He visits the local show. He sees produce better than his own, and he sees some probably not as good. He determines next year to compete with his own produce. He does so, and in that single season he has learnt something—he has been obliged to do so in his endeavours to produce something better than his average. Or, without special effort, he may take a prize. He has then fairly accurately found his place in the farming of the district. And if that place be a high one in the particular line he has taken up, he knows he may reasonably venture at one of the national shows—and that is where the scope of the latter begins. The country show has brought him out; the national show develops him further, and he becomes a desirable acquisition and an educational factor to his district. As summing up the matter we might say that every farmer should have a chance to improve his methods; agricultural shows prove an important incentive to improvement, and the country exhibition affords the opportunity for even the beginner to make a start.

**Educational Value of Shows.**

We have grown so accustomed to the show system, it has become so integrally a part of our rural life, that it would be difficult to conceive any district of importance without an annual exhibition. There is one thing we may be quite certain about—without annual shows our progress would be considerably lessened. And why? Because of the educational value of the show. This aspect is one that is liable to be lost sight of in the excitement of keen competition, and we think the present is a suitable opportunity of emphasizing its importance. It is not simply the visitor to the show who does not fail to realize the educational value of the exhibition; however, unconsciously, he imbibes a certain amount of useful knowledge from his inspection of the various sections. The executives of the shows are also to some extent at fault. What is the present position? The judges make their inspection. In the case of animals a few persons may gather around, and, if the judges are in the mood, they will answer questions and perhaps discuss the points of the animals they are judging. But even given the most talkative and good-natured judge, how many persons get the benefit of his advice? Perhaps a dozen, half of whom are exhibitors. Then take the produce and poultry sections. At most of the large shows the public is rigidly

excluded whilst judging is proceeding, and all that is known thereafter is that certain prizes have been awarded. We are not deprecating the exclusion of the public at judging, but what we desire to point out is that the reasons for the granting of awards are not made generally known. In other countries this difficulty is overcome and the show rendered of real educational value by two methods—the adoption of the point system of judging and the holding of lectures by the judges illustrated by examples culled from the exhibits. Could not either of these systems be adopted at some of our shows? The lecture system certainly presents difficulties, and, if it be not found practicable—yet at least—the adoption of the point system of judging would prove of immense value to visitors to the shows. In this system every feature of an exhibit is ascribed a maximum number of points, and the individual exhibits are then gone over carefully and the number of points which each feature calls for in ~~the opinion of the~~ judge is noted down on a card which is displayed for the rest of the show alongside the exhibit. This enables comparisons to be made and shortcomings to be noted for future avoidance by the exhibitor and by others, whilst an idea is given of what really constitutes excellence. It may not be found practicable to introduce the system into all sections of the show, yet even if only a few lines were thus judged the educational value of the show would be considerably enhanced. It would be instructive to have the views of show secretaries, judges, and others on this matter for publication, and we invite correspondence.

**Ticks in the Karroo.**

We are bound to say that we admire the spirit that prompted Mr. J. C. Collett to read a paper on the eradication of ticks the other day before the Middelburg (Cape Province) Farmers' Association, and which pervaded the whole of his discourse. His remarks throughout breathed a determination that must have evoked an enthusiastic response from every progressive farmer present. Mr. Collett treated his subject first historically, and then, in the light of history, in a prophetic spirit. He took his hearers back thirty years, and said: "When I was a boy I remember one of my elder brothers bringing a horse on to my father's farm; this horse we youngsters christened Guy Fawkes, because he was so ugly. This to my mind was caused by the fact that he was covered with ticks. We looked upon him with great curiosity, not because we were not used to horses, but because we were not used to seeing ticks. When the old Boss came to see him, about the first thing he said was, 'Well, you had better take him away again and dip him,' so we dipped him." Thirty-five years ago, Mr. Collett went on, there was very little scab, and they washed their sheep in hot and then in cold water just before shearing. Twenty years ago there was a great deal of scab, and dipping was the order of the day. Then came the days when men complained that their flocks got reinfected from their neighbours'; "then, to our happy release, came the Scab Act, and to-day my scab inspector tells me we are clean." "They say history repeats itself," Mr. Collett observed, "so whether we like it or not, I think history is going to repeat itself here and kill ticks."

The purpose of Mr. Collett's paper was to bring stockowners to see the necessity for the institution of compulsory dipping in the Middelburg district. In his opinion the day would come when dipping would be made compulsory, and he wanted them to forestall the Government and ask for it. "Gentlemen," he said, "I believe in compulsion. A compulsory Act is easy for the man who wants to do right; the law is not going to enforce an Act upon us that we cannot stand. Had it not been for compulsion we would still have been dipping our sheep. My chief reason in endeavouring to get the Tick Act enforced is that I believe we have really got the scab under."

**Scab and Ticks.**

Mr. Collett's idea is that they should save themselves the eventual necessity of installing dips by beginning at once with hand-dressing. He pointed out that, while they dipped their sheep at frequent intervals for scab, ticks were kept under, but that, as scab lessened, the ticks increased until now they are worse than scab. He believes that ticks are worse on his farm to-day than on most farms in the district, on account of the fact that he was one of the first to get rid of scab, for in twelve years Mr. Collett has only dipped once (through a sheep that he had purchased). In confirmation of his opinion that scab eradication may be accompanied by increased tick infestation, Mr. Collett quoted the following letter from Mr. J. R. Ivy, of Fauresmith, in the Orange Free State: "Having noticed several of my sheep scratching as though they had scab, I examined them and found them infested with ticks. In some cases I took nearly a score from one sheep; several sheep died, and I believe it was from the ticks. The next day I went to the top veld, and my boy called my attention to swarms of ticks on the ground. I have been on this farm five years, and this is the first time I have been troubled this way."

These two instances—the one from the Karroo and the other from the Orange Free State—would seem to show that ticks are becoming more numerous, and to point to the advisability of farmers keeping a sharp lookout for any such signs of increasing tick-infestation. Mr. Collett's advice to the farmers in his own district may be summed up in his own words: "Since prevention is better than cure, why not let us ask the Government to enforce a modified Tick Act here, and let us save ourselves the expense of dipping cattle by starting in time with crush kraals and hand-dressing. . . . Although I have not done it I can well believe and see the force of building a small room with cement floor, and with a spray pump (instead of a dip) spray the cattle. In these parts where we only have a few cattle I am sure we will never be forced to build cattle dips; the difference here is the ticks are located in two or three very get-at-able places, and not all over the body like down-country or Natal."

**Horse-sickness and Immunization.**

Judging from the accounts which have appeared in the Press and from reports received by the Veterinary Research Division, the present season appears to have been a particularly virulent one for horse-sickness all over the country. From the point of view of the scientist

the season has been of interest on account of the severity of the test it has afforded of the immunizing process which has now for several years been undertaken by the Director of Veterinary Research. There have been several instances in previous years where inoculated horses have succumbed to horse-sickness, the virulence of the veld infection breaking down the immunity conferred by the inoculation. This, after all, is not surprising, for the process of immunization in the case of horses does not claim to confer a higher immunity than is provided by a natural attack of the disease; and, as is well known, the latter does not give absolute protection against every strain of horse-sickness. For example, a horse can "salt" naturally in the Pretoria district, and though he has thereby acquired a high degree of resistance he is not necessarily absolutely immune to horse-sickness at Delagoa Bay. This is a consideration upon which particular stress is laid by Dr. Robertson, the Acting Director of Veterinary Research, and it should be carefully borne in mind by all who are watching the experiments of the Veterinary Research Division in the immunization of equines against horse-sickness. We know that Dr. Theiler regards the immunization of horses against this disease as still in the experimental stage; the results at present are good, but they are at the same time uncertain. For example, at the Onderstepoort Station, nearly a hundred horses have this season been immunized, and the mortality has been 8 per cent.; and yet at Potchefstroom three horses were inoculated with the same vaccine, and all three died. There was absolutely no difference in the vaccine, the results being simply due to the differing susceptibility of the animals in question to horse-sickness. At present the immunizing vaccine consists of three strains of the disease, and endeavours are being made to increase the polyvalence of the material used in order to meet the differing susceptibilities of animals.

**A Virulent Blue-tongue Season.**

Discussing the work which the Veterinary Research Division is performing in connection with the immunization of equines against horse-sickness leads us naturally to a consideration of other of the many interesting and useful activities of this Division, under the temporary charge of Dr. Robertson. We may take, for example, the work that is being done in connection with blue-tongue immunization. A number of sheep farmers have complained that the blue-tongue vaccine which has been supplied this season has failed to secure immunity of their flocks against the disease, yet the material is prepared from the same strain of infection in the same way and by the same assistant is in the past; and Dr. Robertson can only explain its failure in some instances by the fact that this year has been a very severe one for blue-tongue, and that the natural infection has been so strong that the immunity conferred by the vaccine has broken down—much as has occurred in connection with horse-sickness. Farmers should remember than no vaccine of any kind is infallible—a fact which, we fear, is too often overlooked. Sometimes anthrax vaccine fails to protect, and the history of any smallpox outbreak will show cases where vaccine lymph failed to protect vaccinated people. An inquiry into the alleged failure of the blue-tongue vaccine this season to yield thoroughly convincing results would have to be made upon

a statistical basis; but it is always a difficult matter to obtain reliable statistics from stockowners, who are often rather loose in their remarks—e.g. "heavy loss," "dying in all directions," "vaccine quite useless"—but careful inquiries often show a very small percentage of actual mortality. Dr. Robertson has been making investigations into the matter, and his report will be submitted shortly to the Secretary for Agriculture. In passing, it may be observed that the very fact of sheep contracting blue-tongue after inoculation yearly for the past three years in itself would seem to prove the severity of the disease this season. Were the vaccine to be strengthened the disease might be produced and cause heavy mortality in many susceptible flocks.

**Other Phases of Veterinary Research.**

Anthrax appears markedly on the increase, and the output of the vaccine has gone up by leaps and bounds. There appears to be some difficulty in obtaining a steady supply from Europe, and the veterinary laboratories often experience delays in its delivery. The question of its local production is now under consideration. Sponsziekte vaccine is giving uniformly satisfactory results. The single vaccine simplifies the inoculation very greatly, and it is in much favour even with the natives in the Transkeian and other reserves. Its use has been attended with best results, and there are indications that by its use the disease may eventually become eradicated from certain districts where for years it has been enzootic.

Mr. Walker, in charge of the Grahamstown Station, is endeavouring to classify and investigate the common diseases of chicks and ostriches generally, and is accumulating a mass of evidence. He is also endeavouring to work out a line of treatment for some of the common ailments of birds, with a list of the doses of the common drugs generally used in medicine. Mr. Walker has also found a new blood parasite in the ostrich, a leucocytozoon, hitherto undescribed. This he suspects to be the cause of much of the anaemia and poverty amongst birds. At present a number of experiments are being carried out at Bowden Hall, in the Cape Province, in an endeavour to find out which, if any, of the biting flies are responsible as carriers of the disease. This experiment has also in view the possible rôle of mosquitoes as reservoirs of the disease. Many drugs have been tried, with negative results.

Another new disease has manifested itself among ostrich chicks, a form of aspergillus, due to a fungus—a *fumigatus* invading the lung tissue. Attempts at infection are being carried out. In working with these diseases one must also rear the healthy chicks for the material necessary for the experimental work. This takes up much time and is full of endless disappointments, as chick rearing is by no means an easy matter even in the best of conditions, and these are not found in the laboratory yard. Progress in investigation must, therefore, be slow.

These are but a few of the phases of the work which the Veterinary Research Division has now in hand. The activity of the Division is very great, and scientific investigation is being carried forward steadily. Research work, however, is necessarily slow; there are so

many hypotheses to be investigated, those yielding, on experiment, negative results being eliminated and the probable ones gradually whittled down to one or two, which then remain to be proved—and they can only be proved after long and laborious experiments, requiring much patience, time, and confirmation.

**The New Cape Organization.**

The first annual congress of the newly amalgamated farmers' organizations of the Cape Province ran through a most successful three-days' sitting at Port Elizabeth at the beginning of June. Owing to the fact that the *Journal* goes to press at the end of the month, we were unable to give an account of the proceedings in our last number, but the report we publish elsewhere in the present issue will give an idea of the useful work that was accomplished.

The step which the various farmers' organizations of the Cape Province have taken in thus joining forces is one that is well in keeping with the spirit of the times. Rarely is the truth of the old and well-worn dictum, "Union is strength," more strikingly illustrated than in its application to the amalgamation of rural forces such as has gone on steadily in the Cape Province for many years past, has been finally accomplished in Natal, the Transvaal, and the Orange Free State, in the form of Provincial Agricultural Unions, and now has reached such a successful issue in the Cape in the banding together of the several already great rural organizations of that Province. The farmer is benefited, and the country as a whole is benefited by this form of co-operation; and, what is more, the Department of Agriculture is assisted by having its attention drawn, concretely and by a reliable body of opinion, to the needs of the agricultural interests of the country. There is another aspect of the value of such co-operation as we are considering. The interchange of views, the opportunity for which is provided by the annual congresses, is distinctly educational, and must make for the gradual broadening of the views of those who might naturally otherwise be inclined to take too local, too provincial a view of affairs.

For these reasons the great step which the Cape farmers have taken is to be welcomed, and those concerned are to be congratulated upon the success which has attended the inaugural congress of the Cape Province Agricultural Association.

**Questions at the Conference.**

The conference took the opportunity provided by the presence of Mr. F. B. Smith, the Secretary for Agriculture, to obtain information upon a number of points of interest, and we think a résumé of the information afforded by Mr. Smith will be welcomed by many who were unable to attend the congress.

The first question that came up was, naturally enough, lamziekte investigation, Mr. S. Butler asking, on behalf of the Vryburg farmers, whether Mr. Arthur Stead, of the Department of Public Health, Orange Free State, was to have a free hand in experimenting with his suggested remedies for lamziekte—a free hand as to the place and scope of experiments, as to the funds at his disposal for carrying

them out, and as to time. In reply, Mr. Smith said that Mr. Stead had been asked exactly what experiments he wished to carry out, and Dr. Robertson had been deputed to do the work on the station he thinks best or most favourable. Mr. Stead would have every opportunity, but to ask that he should have a free hand and any money he wanted was an impossible request.

Asked why an experiment station had not been established at Uitenhage in connection with the investigations, Mr. Smith said that such a station would cost a deal of money, whilst they, furthermore, already had as many stations as the staff could deal with. At the time the request was made Dr. Theiler and Mr. Burtt-Davy were about to leave on furlough, and it was thought that the further consideration necessary must await their return.

The question of the subsidizing of veterinary surgeons by Government, in the same way as is done with district surgeons, came up, and Mr. Smith was asked whether there was any chance of the Government's taking this step. Mr. Smith replied that the Minister had considered the matter, and that there was a good deal in the suggestion. Encouragement should be given to veterinary surgeons settling in districts not populous enough to keep them without assistance. He was encouraged in this view because there were a number of young South Africans qualifying oversea as veterinary surgeons, and as they came back it would be a good thing to get them established here and there in the country and give them a subsidy to help them make a start.

**Soil Surveys, Guano Depots, and Tuberculosis.**

In reply to a question by Mr. R. H. Struben as to whether the Government had any idea of establishing a Central Institute of Agricultural Chemistry, Mr. Smith remarked that he was unable to say what the Government would do. There was a small chemical laboratory at Pretoria with an enthusiastic young chemist in charge, and he hoped to be able to build up a strong Division of Chemistry, also strong divisions at the Agricultural Schools. Questioned as to whether it was the intention to make a soil survey of the whole Union, Mr. Smith said he hoped to be able to take up the question of soil surveys, but to extend the investigations completely over the whole Union would naturally take a very long time. In the first place geological maps would be needed and the geological survey of the Union was not nearly complete. They would take up the question as soon as possible, and particularly in the districts where the need was most pressing.

A delegate asked whether, provided farmers offered labour and land, the Government would conduct manurial experiments; to which the Secretary for Agriculture replied that he thought he could promise to detach a man to supervise such experiments, though not to live on the farm.

Regarding the question of reopening a guano deposit in the Eastern Province at Port Elizabeth, Mr. Smith said this was unlikely. There was only a limited supply of guano—from 5000 to 6000 tons, and there were applications for about 12,000 tons. The guano came from the various islands and was mixed and sent out as uniform in

quality as possible. If this had to be done at several depots instead of one it would only increase the cost. He thought it would be just as cheap for farmers to get it from Capetown as from Port Elizabeth if the expenses of the upkeep of the depot were added to the price charged.

Speaking on the Government policy in relation to tuberculosis, Mr. Smith said that Government could only give relief under this head by amending the Stock Diseases Act, whether as regards the slaughter of imported stock or the increase of compensation. Government had done much to reduce liability to loss through infected stock being imported into the country. Holland had established regular tests of all animals exported to South Africa, certificates of freedom from the disease were issued, and even charts were made of the marks of the stock exported so that animals could be identified on arrival here. In England similar steps were to be taken, but progress was slower. But even if animals were tested in England and found to be free from the disease, they would still have to be tested in this country.

As to raising the quarantine in certain districts in the Western Province, he could not undertake that, neither could he have a systematic inspection and testing, because there were not enough men to tackle the whole Province. He agreed there was hardship, and that the results of the tests did not reveal a high percentage of infection; nevertheless a number of cattle that had come from the Western Province into Natal had reacted soon after arriving, so that he feared some underhand work was going on somehow. It was in the interests of the farmers that they should submit their stock for testing.

**The New Natives' Land Act.**

During the session of Parliament which has just closed, the farming interests of the country have come in for a fair share of attention. Among the more important Bills passed, reference may be made here to the Natives Land Act, 1913, described as an Act "to make further provision as to the purchase and leasing of land by natives and other persons in the several parts of the Union and for other purposes in connection with the ownership and occupation of land by natives and other persons." Briefly, the object of this Act is to provide lines of demarcation between natives and non-natives in so far as the ownership of land is concerned. The country is to be divided up into "native" and "non-native" areas, to advise in connection with which the Governor-General is empowered to appoint a Commission.

This Act is one with the provisions of which every farmer needs to be well acquainted, for certain chapters of it have a distinct bearing upon farming conditions as we find them in this country. We have mentioned that a Commission is to be appointed to inquire into and advise the Government on the question of the demarcation of native areas within the meaning of the Act. Until this has been accomplished, except with the approval of the Governor-General a native may not purchase, rent, or otherwise acquire any such land from any person other than a native; and, on the other hand, a person other than a native may not purchase, hire, or otherwise acquire any such land

from a native. This, of course, does not affect any agreement or arrangement made and in existence at the commencement of the Act which is a hiring or leasing of land.

The acquisition of land in the scheduled native areas and additional native areas is dealt with in the first section of the Act, wherein it is provided that no person (except a native) shall acquire land in any native area either by purchase, hire, or any other means. Exceptions to this restriction may be allowed by the Governor-General with the approval of Parliament. It is provided in a subsequent section that natives may be allowed on non-native farms as labourers—a term which is interpreted to mean "a native who resides on a farm and is bona fide, but not necessarily continuously, employed by the owner or lessee thereof in domestic service or in farming operations," and who "renders ninety days' service at least in one calendar year," no rent being paid or valuable consideration of any kind, other than service, being given by him to the owner or lessee in respect of his residence on the farm.

These are the main provisions of the Act so far as it concerns the farmer.* The new law strikes a death-blow at the "Kaffir-farming" which it has been the earnest wish of every progressive landowner to see abolished, by the simple process of dividing up the country into native and non-native areas and rendering illegal the acquirement in any shape or form of land outside either of those areas by persons for whom the area is intended. It is safe to say that this Act will considerably affect labour conditions in many parts of the Union. It will mean the clearing off of large numbers of natives from European farms, the native simply being allowed to work in return for a wage. The result will be good, clean, straightforward farming, whilst land in non-native areas that is not being farmed by Europeans will simply remain idle. This in itself is a direction in which the working of the Act will have far-reaching and beneficial effects. For it means that landowners who are doing nothing to develop their properties will be deprived of the interest on their capital with which they have in the past been provided by the hordes of native tenants that we too often find in this country, and they will be faced with the prospect of idle capital, a condition of things which they must either endure or mend by renting or selling their land to Europeans. In this way the Act will constitute a step towards the breaking up of large holdings and the further settlement of the land by European farmers, and regarded thus it is a piece of legislation that must be welcomed by all who desire to see the country progress. It will be interesting to watch the effects of this Act upon rural conditions, although it will necessarily be some time before it is in full operation.

**Projected Railway Construction.**

Amongst other legislation of the session just closed is an Act providing for new railway construction as follows: In the Cape Province: (1) From Carnarvon, via vicinity of town of Williston to De

* Farmers and others would do well to obtain a copy of the Act (No. 27, 1913) and carefully study its provisions. The Act was published in the *Union Gazette Extraordinary* of the 19th June.—ACTING ED., *Agricultural Journal*.

Drift, thence to a suitable terminus on or near the farm Twee Riviers, with an extension from De Drift or vicinity to Calvinia. This will be a light railway 213 miles in length. (2) From a point in the neighbourhood of Gairtney to outspan at junction of Barkly East and New England roads, in the direction of Barkly East. This also is to be a light railway 17½ miles in length. (3) From Idutywa to Umtata, 75¾ miles. In the Transvaal: (1) From Delarey to junction with Cape Western Main Line at or near Pudimoe, via vicinity of town of Schweizer Reneke, a light railway 88 miles in length. (2) From Bethal to Volksrust, via vicinity of Morgenzon, Amersfoort, and Wakkerstroom, light railway 103 miles in length. In the Orange Free State: (1) From Fauresmith to Koffyfontein, a light railway 34 miles in length. (2) From Aliwal North to or near Zastron, via vicinity of town of Rouxville, a light railway 52 miles long. (3) From a point on the Free State Main Line in the vicinity of Kroonstad to Vierfontein, 56 miles. (4) From Vierfontein to Bothaville, a light railway 24½ miles long. In Natal (all light railways): (1) From Donnybrook to Underberg Store (or vicinity), 34 miles. (2) From Paddock to Harding (2-feet gauge), 50¼ miles. (3) From Schroeders to terminus at or near Lot No. 14A, via vicinity of Wartburg, 13½ miles. (4) From Dalton to terminus near One House Farm in vicinity of main road from Dalton to Kleine Noodsberg, via Fawn Leas, 14 miles. (5) From Gingindhlovu to Eshowe, 19 miles.

These new lines are estimated to cost in the aggregate £2,731,631. Except in the case of the Paddock to Harding extension, the gauge of all these lines will be 3 ft. 6 in.; those described as "light railways" being constructed and equipped primarily for the conveyance of produce and goods.

**Further Dipping Legislation.**

Progressive stock-owners will welcome the passage of the Dipping Tanks Further Provision Act, a piece of legislation that constitutes another step towards the much-to-be-desired time when every stock-owner will possess the means of keeping his animals free from insect-borne diseases and of maintaining them in a healthy condition. This Act empowers the Minister of Agriculture to order the owners of holdings carrying live stock to construct dipping tanks, whether the owner himself is in occupation or not. In cases where the owner does not personally occupy his farm he is entitled to receive from his tenant or any person who derives from him the right to graze stock on his land, interest at the rate of 6 per cent. per annum on the initial cost of the dipping tank. Loans for the purpose of the erection of tanks may be obtained from the Land Bank, and if the owner of the land has obtained such a loan then he has the right to demand interest from his tenant on the sums he has actually paid in instalments to the bank on the advance. If there be more than one person grazing stock on the land as tenants, each will be liable to pay to the owner a share of the interest in proportion to the extent to which he is using the land; in case of dispute as to the share of each person, the magistrate of the district is to arbitrate.

In regard to the obtaining of advances from the Land Bank, the new Act renders the provisions of Sections 2, 3, 5, 6, and 7 of Act No. 20, 1911, as amended by Section 33 of the Land Bank Act, 1912, applicable.

**The Late Dr. Gunning.**

At 10 o'clock on Monday morning, the 23rd June, Dr. Jan Willem Bowdewijn Gunning, M.D., Chevalier du Merite Agricole, Director of the Transvaal Museum and Zoological Gardens, passed away quietly in his sleep at his residence in Pretoria.

Dr. Gunning first saw the light of day on 3rd September, 1860, at Silversum, in Holland. He was a born naturalist, evincing at an early age great interest in the sciences which were destined later to play such an absorbing part in his career. From boyhood he was a collector of natural history specimens, extending his interest even to reptiles. Dr. Gunning was the second son of the late Dr. J. H. Gunning, of the Universities of Leyden and Amsterdam; he was educated in Holland, France, and Germany, and attended the Universities of Amsterdam, Leyden, and Jena, taking his degree of M.D. at the last-named University. In 1884 he came to South Africa, and in the same year married Miss Suzanna Neethling, daughter of the Hon. M. L. Neethling, of Stellenbosch. For a while he practised as a medical man in the Orange Free State, and then returned to Jena for further study. In 1888 his wife died, leaving him three sons. In 1889 he married Miss Ellen Dobbin, daughter of Mr. W. R. Dobbin, of Bethulie, Orange Free State, and he leaves a widow, three sons, and two daughters to mourn his loss.

Dr. Gunning practised at Bethulie and Smithfield and in the Cape Colony until 1892, when he came to Pretoria and was appointed the first Director of the newly formed Museum. It was owing to his great efforts that the Pretoria Zoo was established in 1896, of which he was made Director in addition to his control of the Museum. Two years later suitable ground was obtained for the establishment of proper Zoological Gardens, and it is due to Dr. Gunning's enthusiasm and hard work that the Transvaal Zoological Gardens occupy their present high place in South Africa.

Dr. Gunning was largely interested in agriculture, and was Vice-President of the Transvaal Agricultural Union, of the Pretoria Agricultural Society, of the Transvaal Kennel Club, and of the Pretoria Homing Society. He was a hard and enthusiastic worker, and popular with every one, his kind heart making him many friends.

**The Month and the Magazines.**

The Barbadoes *Agricultural News* refers to some interesting experiments that have been carried out by Rusche with temperate species of cultivated plants, with the object of testing the effect upon the rate of germination of such salts as the nitrates and chlorides of sodium and potassium. Potassium chloride was found to act not unfavourably on the germination of cereals, peas, rape, and beet, but unfavourably in the case of clovers and other leguminous fodder plants. Sodium chloride was found to be more unfavourable than the potassium salt except with barley, lupines, serradella, and rape. Nitrates are generally more favourable than chlorides; ammonium nitrate, however, resembles the chloride in being distinctly injurious, especially to clovers. Of all the salts employed, sodium and potassium carbonates were found to be the most favourable. As regards the length of roots,

nitrates produced the shortest roots with cereals. The longest roots were obtained with sulphates and phosphates. In the case of peas, the longest roots were obtained when no manure was used.

A paper in *Science Progress* refers to a discussion on animal nutrition that took place at the last meeting of the British Association at Dundee. The discussion, which was contributed to by physiologists, agricultural chemists, and practical feeders, proved to be a remarkable success, the result being the conclusion that entire reliance could not be placed upon chemical analysis as an indication of the nutritive value of any particular food stuff. Only experiments with animals were believed to be final. An interesting investigation was referred to, which consisted in a comparison of the feeding value of Egyptian cotton seed cake with Bombay cotton seed cake. Although the Egyptian cake had the higher value from the chemical point of view, an extensive feeding experiment, sufficient to outrange the limits of experimental error, showed that the cake of inferior composition produced the better results.

In the *Bulletin of the Imperial Institute*, a former Director of Agriculture of Mozambique writes on the progress of the sugar industry in that Province. He says that the output of sugar in 1910 was over 30,000 tons, but that it is safe to predict that in 1914 this figure will be nearly doubled. The valleys of the Inkomati, Buzi, and Zambesi rivers which are proving the most attractive to sugar planters, are low alluvial plains which extend in the case of the Zambesi for a length of 150 miles. Above the limit (say 35 miles from the sea) of serious flooding—in which description is not included submergence for three or four days only, provided there is no devastating torrent—the conditions for sugar planting are ideal, though preference is always to be shown for the black alluvium that the heavy, luscious canes require, and sandy outcrops are avoided. The many kinds of cane cultivated fall into two groups; the one consisting of luscious green and purple canes of local or foreign origin, the other the hard Uba of Natal. There are fields of Uba on the Zambesi from which twelve or more ratoons per plant have been taken. It is probable, however, that on the rich, alluvial plains heavy canes will oust the Uba, which is essentially a dry-land cane.

The *Scientific American* records that Germany is evolving an ever-increasing number of potato products and is thus rapidly solving the problem of disposing of the once enormous surplus of this crop. A number of establishments in the country are now turning out quantities of dried potatoes in various forms for use in feeding cattle. It appears that dried potatoes do not cause the forms of sickness that result from a diet of raw potatoes. Moreover, raw potatoes can be preserved for only a limited time, while to boil potatoes would impose upon the stock-raiser more expense than the circumstances justify.

The *California Cultivator* has the following sage advice to offer: "When you buy stock, take the boy along. Time spent in explaining to him the desirable and undesirable points of various animals is time well spent. Most farm boys get plenty of experience in feeding live stock, but very little experience in judging."

The first seed maize testing day, where seed maize was brought by the sack and tested by the farmers, assisted by their children in school, ever held in Missouri—and, it is believed, in the United States—was held recently under the direction of the Johnson County Board

of Agriculture, Missouri, according to *Hoard's Dairyman.* The farmers came in and brought sacks of seed maize (and incidentally a well-filled dinner basket). In the morning the manner of doing the work was explained, and after dinner the actual testing of the seed was begun; men, women, boys, and girls working alike. In this way a very important but irksome task, generally neglected, was turned into a picnic.

How some old, scaly, scarred, and battered apple trees that had practically ceased all growth and yielded but a small crop of wormy and miserable fruit were renovated is told in the *Rural New Yorker.* They stood on a New England farm purchased by a Mr. H. B. Gleezen. The general advice was to chop the trees down, but Mr. Gleezen decided first to try a plan of his own for renovating them. He built a little pen around each tree, and turned in some lively pigs. These pigs were well fed and supplied with wood ashes. They rooted and tore up the ground around the trees, as pigs will, and when they had shaken up the soil thoroughly around one tree they were taken out and put around another tree, whilst grass seed was sown where they had worked. The trees themselves were dishorned severely and thoroughly sprayed and scraped. The result was that the trees took on new life, made a remarkable growth, and have given large crops of most excellent fruit. In fact, instead of being a nuisance, they are now reckoned as among the most valuable assets of the farm.

# The Wattle Bagworm

(*Chalioides junodi* Heylaerts).

By Claude Fuller, F.E.S., Division of Entomology.

(*Continued from page* 855, *Vol. V.*)

## Bagworm Injury.

Although the full extent of what may be termed the reflex of Bagworm injury has not yet been investigated, being a physiological and chemical inquiry, the general and practical effect is well known. A gross infestation may result in complete defoliation. The more Bagworms that are present in proportion to the size of the tree the nearest to completion is the defoliation. The earlier the main brood of young hatch the earlier is feeding completed, and, conversely, the later the main brood hatches the further into unfavourable conditions for recovery does the injury proceed.

Provided the main brood emerges early and finishes feeding early, say, late in January, the trees have a better chance of recovering because they have the full benefit of the February, March, April, and May rains; their recovery will be largely in proportion to the amount of rainfall for those months.

Where the main army of feeding insects continue their depredations into February and, perchance, beyond, so much the greater is the damage to the plants, because the opportunity to recover, whatever the rainfall conditions, is restricted.

This was notably borne out in 1912 where certain denuded plantations, owing to the absence of rains after February and the lateness of the spring rains, had put on no foliage to speak of up to November. These same trees, had they been favoured with late summer rains, would have shown a marked improvement even with the absence of spring rains, so the two unusual circumstances of the year 1912 intensified Bagworm defoliation to its greatest extent.

Occasionally the number of Bagworms present in a given plantation is in excess of food supplies. Last summer such a case came under observation at Cramond, and the immediate consequence was that the insects starved themselves out when half-grown and perished in myriads upon the soil beneath the trees in a vain attempt to find fresh pastures.(17)

The immediate practical effect of defoliation, or the removal of the organs of assimilation, is to cause bark-binding. Further, thereto, the natural bark increment of the season is seriously reduced. That is to say that if the natural increment of bark for a season be reckoned at 20 per cent., it is possible that no more than a quarter of the increment is gained before the onslaught of the insects reduced bark growth to a minimum. That there is some increment cannot be doubted, as some months of the growing season elapse before the trees

(17) In this instance defoliation was completed prior to mid-February.

feel the full shock of the denudation going on. It naturally follows that such increment is greater or less in proportion to seasonable conditions; that is, if a gross infestation follows upon a late spring the bark increment is less than when it follows upon early spring rains. What the actual bark increment is per annum for any given set of soil, climatic and growth conditions is unknown, and a wide field of useful inquiry lies open in this direction.

What is generally accepted is that up to the third or fourth year from the seed there is not a great bark increment per annum, and that the main increment (I have been told it is quite 20 per cent. per annum) occurs in the fifth, sixth, and seventh years; after the seventh year the gain in weight from an economic point of view is negligible. At the same time, the age of practical maturity varies a great deal. A dry summer has some of the effect that attends defoliation by Bagworm, for the trees become bark-bound and practically no increment is made, whilst, upon the other hand, if two or three wet seasons occur during the first six years of growth earlier maturity from the economic standpoint is reached.

With so many varying factors to influence the result, it is no wonder that there is an entire lack of agreement as to how much damage results from a gross infestation of Bagworms, for a man speaks of his own experience, and his loss to no small extent depends upon the age and condition of the plantations at the time, the seasonal conditions, and the action which he takes or is able to take.

Thus, for example, I have in mind the action taken by one grower who had a gross infestation in a fairly, if not quite, mature plantation. Knowing that as the work of the insects advanced so the bark would bind the more and any delay might run into another twelve months before the trees could again be stripped, he pushed on with harvesting operations and was enabled to fell and strip all but a narrow fringe before the attack had produced bark-binding to an unnegotiable degree. No doubt had sufficient labour and other facilities been available this plantation would have been harvested without any loss, and the loss was reduced by the energy displayed to the practicable minimum. Had this action not been taken when it was the loss would have amounted to the unknown quantity as represented by the loss of bark increment due to defoliation, and six to twelve months' delay in harvesting or, in other words, the interest upon the sum realized by the undertaking.

Bearing upon such matters I quote the following applicable statements from the correspondence before me:—

1. (3500 feet.) The loss of bark that may be attributed to Bagworm attack is 10 per cent. I cannot instance a plantation that has been so ruined that it would not pay to harvest. Plantations in this district always recover, but they require time, that is, nine to twelve months; less in wet seasons. (J. C.)

2. (3500 feet.) It is impossible to state what is the actual loss of bark, for it may be anything from 25 to 75 per cent. from a gross infestation, and when very severely attacked a plantation never recovers its full erstwhile vigour. I can instance one plantation that was so ruined by the insects that it could not pay to harvest it. It was a small old plantation, and was simply cut down and left. (R. P. M.)

3. I have never seen a plantation in this district (3500 feet) so ruined that it would not pay to harvest it. When badly attacked

there is no flow of sap and the trees become bark-bound and will not strip. I have seen plantations near New Hanover which seemed to be irretrievably ruined. (B. W.)

4. (3600 feet.) If the weather is wet a plantation recovers as soon as the Bagworms are off, when new shoots come out. (R. S.)

5. (3200 feet.) So far as the bark loss is concerned, I strip 3½ to 5 tons per acre from seven to eight-year-old trees, and in a very bad Bagworm season, accompanied by drought, I may lose half a ton of bark per acre. I cannot instance a plantation that has been so ruined that it would not pay to harvest, and trees recover in twelve months; in a wet season in six. (M. H.)

6. (3400 feet.) The loss of bark and the recovery of a plantation entirely depends upon the rainfall. I can give no instance of a plantation being so ruined that it did not pay to harvest. (F. W.)

7. (3400 feet.) The loss of bark depends upon the degree of attack. The recovery of the trees also depends upon how severe the infestation was; if a light one, they will recover in three months. Yes; I have seen a plantation where nearly all the trees were killed by Bagworm. (H. W.)

8. (3400 feet.) I have not seen a plantation so ruined that it would not pay to harvest. Trees recover from a gross attack in about six months. (W. W.)

9. (3000 feet.) I have never seen a plantation so injured that it would not pay to harvest. Trees recover from a gross infestation in twelve months. (A. F. M.)

10. (3400 feet.) In the case of a bad attack the loss is about ¾ ton per acre. It takes six months for a plantation to recover. (A. G.)

11. (2200 and 3500 feet.) I cannot give you any instance of a plantation having been so ruined that it would not pay to harvest it. The loss of bark is very considerable, but it would only be a wild guess upon my part to put it into figures. Such could only be determined by specialists with the opportunity of giving undivided attention to making proper observations. I do not think a plantation ever properly recovers from a gross infestation followed by a dry autumn, as I find that many trees die back from the top. I have only experienced gross infestation on my low dry farm (2200 feet). I think the Bagworm would do less harm on the higher farm (3500 feet) even if all the foliage were taken off, as the moisture would soon bring the trees on again. (E. N.)

12. (New Hanover.) To estimate the bark loss from Bagworm would be but a guess. I know of no instance in this district where a plantation has been so ruined that it would not pay to harvest. The recovery of the trees depends very much upon whether or not we get autumnal rains. (C. W. S.)

13. (New Hanover.) There is no loss of bark to my knowledge, nor do I know of a plantation too ruined to harvest. Trees recover in about a year. (W.)

14. (3500 feet.) I cannot instance a plantation so ruined that it would not pay to harvest. The recovery of a plantation depends upon many things—age, vigour, and weather conditions on growing trees. I should say it puts them a year back. In old trees (mature) the tops are often killed and the attack tends to shorten life and to cause them to cork. (F.)

15. (Drummond.) The loss of bark from personal experience is about 4 per cent., but I have never had trees too badly affected to

cut. Of course the Bagworm affects free barking and thus causes a considerable loss of bark. (O.)

16. (2000 feet, Melmoth, Zululand.) If stripped when badly infested the bark loss is about 30 per cent., but it is better to leave the trees for the following season or midsummer stripping. Here, if we have a wet summer, the trees strip well again the following winter. (H.)

17. (3000 feet.) I have never calculated the actual loss, but upon a mild estimate would put it at 1 ton per acre for badly infested trees. I cannot instance a plantation that was so ruined that it would not pay to harvest. Mature trees that have been badly infested never recover properly, and the effect is similar to that of a hailstorm. Last season (1911) my trees were infested early (September); practically every leaf was eaten off and insects ate the bark of the crown twigs which are still showing dry and dead. The trees were not green again until April (1912) and no stripping could be done. Every thing depends on the season. After a bad attack you want lots of rain otherwise you will easily lose considerably. (K.)

18. (Harden Heights.) No plantation is so ruined that it will not pay to harvest if you can wait until the leaves grow again. Last December (1911) on a 63-acre block my trees had not a leaf left, and then the hail came. They are now (September, 1912) beginning to strip and I hope to get them all down before long. I should say 40 per cent. die from Bagworm and gumming—there is more than that in my plantation this year, but the hail must have accounted for a lot dying. Although ten months have elapsed it is not stripping too well, but will do so when we have rain.[18] Ordinarily, a plantation recovers in from eight to twelve months. (A. S. H.)

19. (3600 feet.) I cannot instance a plantation so ruined that it would not pay to harvest. It is very hard to say what the bark loss is, but I think from 10 per cent. to 20 per cent. of the crop. Recovery depends a good deal on the season—from six to seven months under favourable conditions; much longer in a dry season. (T.)

20. (Seven Oaks.) Trees do not recover properly at all when you have Bagworm every year. I cannot instance a plantation so ruined that it would not pay to harvest. (C.)

21. (Harden Heights.) I do not know of any plantation so ruined that it did not pay to harvest it. A bad attack of Bagworm will reduce the yield by half a ton, say, £2. 10s. per acre. Ordinarily, trees recover sufficiently in six months to strip, although they do not completely recover, i.e. to be in first-class health and foliage. (E. T. H.)

22. (3000 feet.) Trees ordinarily recover in twelve months. I cannot instance a plantation so injured that it would not pay to harvest. (E. E. C.)

23. (2500 feet.) I do not know of a plantation so injured by Bagworm that it would not pay to harvest. The loss of bark is about one-third. Young trees take two to three months to recover, sometimes longer, especially in older trees. (C. C. C.)

24. (3000 feet.) I cannot instance a plantation so ruined that it would not pay to harvest. The loss of bark is about 12 per cent. of the crop. Ordinarily, trees take nine months to recover. (O. H.)

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(18) The rainfall from 1st July to 31st October, 1912, was abnormally low—only 2·14 inches fell at New Hanover, against 13, 8, 6, and 11 odd inches for the same period of the four preceding years.

25. (Wartburg.) We cannot instance the case of a plantation so ruined that it would not ultimately pay to harvest. In our case about 10 per cent. of the trees died.(19) Recovery depends much upon the weather. Trees badly infested at the beginning of this year (January) have nothing like recovered yet (October). (H. B.)

26. (Wartburg.) I have not heard of a wattle plantation so ruined by Bagworm that it would not pay to harvest, nor have I sufficient experience to say what the loss of bark is from an attack, but have always heard that it only threw the plantation back for twelve months. One of my plantations grossly infested last December (1911) cannot be stripped yet (ten months later) although it has recovered considerably. (W. H.)

27. (4100 feet.) Ordinarily, if freed of Bagworm, a plantation recovers in eighteen months after it has had the benefit of the succeeding spring and summer. The loss of bark on trees five to seven years old would be about 18 per cent. per annum of their total yield. (H. M.)

28. (3400 feet.) We cannot instance a plantation so badly affected that it would not pay to harvest. The bark loss must depend on many conditions, including severity of attack. To the best of my belief, a plantation never thoroughly recovers after a gross infestation. That is to say, years after being attacked, in dry or frosty weather, or under other adverse conditions, these old Bagworm-smitten plantations are the first to decline stripping. They always have a hide-bound appearance as compared with trees near them which have never been affected. However, this may not be entirely attributable to Bagworm, because in our experience, without exception, the acres infested have always been those under the worst trees—trees on shallow or otherwise unsuitable soil. On these bad acres the worst trees have been most grossly infested. (A. C.)

### THE MONETARY LOSS IN RELATION TO CONTROL MEASURES.

The economic control of any insect pest by such measures as time and experience have so far taught must, for practical purposes, be reduced to a basis of pounds, shillings, and pence. The extermination of the Bagworm has to be recognized as an impractical proposal so far as South Africa is concerned. To contemplate it for a moment is only to contemplate devastation through the land and an unlimited expenditure. I would not touch upon the matter had it not been proposed to me, and if—in dismissing it in so few words—I appear at all discourteous, I would say at once that nothing is further from my thoughts and my intentions. The Bagworm, as a native insect, exists throughout the length and breadth of the land, and, willy nilly, it will for ever levy a tax upon the wattle grower, the greater or the less apparently according to many varied conditions. The question at issue is, can that tax be reduced to a reasonable burden by any known measure of control.

Practical measures for the control of insects of this nature can be generalized under three headings. These are:—(1) Treatments which will kill the insects; (2) measures that will mitigate their abundance and spread; and (3) encouraging such nature checks as do exist and increasing them by the importation of likely parasites from abroad.

(19) There are always a certain number of dead trees in any plantation at maturity. They are victims of a form of gumnosis. Trees suffering from excessive gumming invariably come through a Bagworm attack badly and frequently succumb soon afterwards,

Any action taken is dependent upon the monetary loss. From what has already been said it is practically impossible to generalize upon what that monetary loss amounts to. With a view to arriving at it indirectly I asked my correspondents if they would say what amount per annum they would be prepared to expend to prevent a gross infestation.

Most were very chary of giving any reply whatever, and from internal evidence found in the replies to other inquiries it is obvious that in most cases a round figure for the life of the plantation has been given and not an annual outlay. The following are the actual offers made: 2s., 2s. 6d., 20s. (2), 40s., and 60s.

Of course 2s. and 2s. 6d. per acre for the life of the plantation are just as absurd as 40s. and 60s. per acre per annum would be, figures which would work out at £280-£420 per acre over seven years.

I have conceded that the 2s. and 2s. 6d. offers were intended as annual expenditure per acre per annum, and the 40s. to 60s. per acre represent a gross outlay per acre during the life of the plantation.

Taking the figure 2s. 6d. per acre per annum and extending it over seven years we arrive at 17s. 6d. per acre. Which means that a man with 1000 acres is prepared to expend £150 a year or £850 extended over seven years. This seems a generous enough figure. Knowing what I do of wattle culture I seriously doubt the discovery of a grower who would lay out £2000 to £3000 for Bagworm control over a 1000-acre proposition. In the aggregate few planters would be prepared to expend £1 per acre.

In order to put the matter in another way let us assume a mature plantation of 1000 acres, and placing the yield at 4000 tons with a f.o.r. ([20]) return of £20,000. The effect of gross Bagworm infestation ([21]) may cause a depreciation in the return—where circumstances and conditions are not exceptionally bad—of 10 per cent. to 20 per cent. and delay the harvest for one year. The actual loss may then be set down at 15 per cent. to 25 per cent., or £3000 to £5000 on the proposition or £3 to £5 per acre. It is not necessary to discuss a greater loss, first, because such is exceptional and, in the ordinary course of events, not to be anticipated. Any calculations, based upon a greater degree of loss or a greater value of the output, give figures which—whilst perchance true for exceptional cases—reflects a fictitious state of affairs.

As a matter of fact the return of four tons to the acre is above the average, and a f.o.r. return of £5 would be excellent these days; hence it would be fairer to reckon the return at 3½ tons and the f.o.r. price at £4. 10s., or, say, a return of £16 per acre. The monetary loss then works out at £2. 4s. to £4 per acre.

It is scarcely an economic proposal to advise the expenditure of £2 to £5, as the case may be, with the object of preventing that amount of loss; accordingly the total expenditure per acre for control cannot be put at a higher figure than 20s., or about 3s. per acre per annum. Such a figure appears to me totally inadequate to meet any recognized method of control to prevent a gross infestation.

Bagworms may be removed from the tree by hand, and in the case

([20]) f.o.r., free on rail, e.g. not delivered to port of shipment.

([21]) As a matter of fact gross Bagworm infestations seldom involve such large areas.

of small trees this is not impracticable,(22) otherwise they must be mechanically controlled by applying poisons to the leaf surface. These are applied by machinery, and despite the many drawbacks at once apparent it is not impossible to devise the machinery for the purpose, especially for plantations with an espacement of 8 to 12 feet.(23) Labour-saving machinery would be a *sine qua non* and a fair sum would have to be expended in the purchase price and the upkeep. Putting this aside with the many other questions involved in the perfecting of machinery suitable for plantation work, in using which there would have to be safeguards against fire, we may consider what is required. Ordinarily such a treatment is described as "spraying" and involves the use of water. The haulage of water, however convenient supplies of it may be, is so expensive an item that I have eliminated it in favour of dry or dust spraying. Assuming we have a perfect power-sprayer from which all risk of ignition has been eliminated (there is no greater bugbear to the wattle grower than fire), and which suits our requirements, we have but to apply the poison. What we want to do, actually, is to prevent a gross infestation occurring from the fourth year onwards, on the assumption—subsequently explained—that a gross infestation during this period is the outgrowth of earlier infestation. Three and a half year old trees suggest themselves as the most suitable to treat. Ordinarily speaking, trees at this age are of no mean proportions, so that it is impossible to suggest any form of application that would cost less than 1d. per tree; this, at a 6 by 6 espacement, means £5 per acre.

This treatment would have to be adopted with the chance ever present that a succession of good seasons would affect the insect or reduce its attendant mischief to a negligible consideration. Quite apart from the expense involved there is the extra burden of trouble, and this alone is a great factor against the general adoption of any remedy along these lines that might be devised. One most experienced grower says he "would not expend money in this direction, having enough of the gambling spirit to back the plantation's luck." If, however, gross infestation were present he "would be prepared to pay very highly per acre for a dead certain cure, the amount depending upon the value of the area affected." That a dead certain cure can be devised even for the grossest infestation is absolutely possible, for there can be no doubt that many of the arsenical insecticides properly applied to the trees would reduce the infestation to a negligible number of Bagworms, but the cost would be prohibitive in the case of five to seven year old trees as has, to all intents and purposes, been shown.

Let us look at this in another light. Even supposing a treatment giving perfectly satisfactory results can be perfected which will not cost more than £1 per acre, and a grower has 300 acres to do, he has to be prepared for an outlay of £300 solid cash; and where a comparatively large sum like that is involved I fear that the treatment will more often go by the board than be adopted.

Under this caption the actual loss to the country may well be considered. It is seen from what has foregone that the loss from Bagworm attack is by no means universal, and whilst this party may

(22) Several growers have assured me of the practicability of removing Bagworms from young trees and that they have carried out this practice.

(23) Mechanical contrivances for a 6 × 6 espacement could be constructed, but would be awkward for hillside work.

lose 10 per cent. and that 30 per cent. of his bark the average loss over the gross annual output is very much less. For argument's sake it may be conceded that 3 per cent. will approximate the annual loss, or, in other words, if 3 per cent. of the value of the export trade is taken as the basis, we arrive at the conclusion that the cost of this pest to the wattle-growing community is £6000 per annum, with the export value at £200,000.

Mention has been made of "measures that will mitigate the abundance of Bagworm and consequent spread." This is a matter which may be discussed tentatively, and the question at once arises: What can the wattle grower do in this connection and how far is he prepared to go?

A certain factor in the maintenance of Bagworm is to be found in individual trees and groups of old trees which occur in many places. These are perhaps not very potent sources of mischief, but such as they are they might with advantage be destroyed throughout districts devoted essentially to wattle culture. It is a matter which the wattle growers can easily look after without involving legislative assistance, because, in the first place, the majority of such trees are the property of wattle growers, and such as are not are not sufficiently menacing to make it worth while invoking such an aid.

Practical foresters have always urged the undesirability of "pure plantations," and have pointed out the ultimate disadvantages of such in wattle growing, these disadvantages being of course the spread of insects and diseases. But the wattle grower is out solely for growing wattles, and must have "pure plantations." A suggestion has been made to him that he should plant belts of other trees throughout his plantations, it being urged that such a course would materially hamper the spread of Bagworm. However excellent this idea may be its impracticability is at once apparent. In the first place it means a considerable area of relatively unreproductive planting, and in the second place a tree should be grown that will not only keep pace with the wattle but outstrip it, in order to prevent wind-spread the better.

Then early felling might be advocated where a certain degree of Bagworm infestation was present. Of course trees should be felled at opportune times to ensure against the Bagworm upon them reproducing, and to this would be added a suggestion that all débris should be destroyed.

But the position is that no sane wattle grower is going to fell and strip an immature plantation. However Bagworm-infested his plantations may be there is just as much chance that the trouble will be less the next season as there is that it will be more intense; and, further, there is always an equal chance that the following season will be a propitious one and a bark increment made despite Bagworm.

From a knowledge of the insect's development one would naturally advise that felling of infested plantations should take place before September. Such would be a good practice indeed, and should be adopted wherever possible, but its practicability is limited because such action is dependent upon whether or no the trees will strip in the autumn or in early spring. The destruction of debris by fire is good practice, for it destroys any insects which may be on them—diseases too perchance lurking in the decaying foliage—and it prevents wood borers accumulating. But it is a practice which is part and parcel of wattle culture for the débris is, generally speaking, always

fired. As to when to fire it of course one would recommend as soon after felling as possible, but here again this is not part of wattle culture, because the débris is fired with a dual purpose. Firstly to get rid of it, and secondly to stimulate the seeds lying in the ground to start into growth to form a new plantation. Hence it is fired at the opportune times for the self-sown plantation to be brought into being. That firing at such a time is the best practice stands unchallenged, because Bagworms do not escape from fallen trees and also because there are no fungus diseases of any import and no borers against whose increase a guard is to be set.

In writing this I have not lost sight of thinning. It must be remembered that no good plantation is felled and stripped throughout *en bloc*. On nearing maturity it is thinned and a partial harvest made, whilst the trees left gain proportionately as the result of thinning. From the débris of such thinning Bagworms may escape to the surrounding trees, but there is no way of guarding against such except by dragging the débris out of the plantation. The attendant risk is, from my observations, so very small that it is doubtful whether such a precaution would prove economic in practice.

Under a third caption, among Practical Measures of Control, I have spoken of "encouraging such nature checks as already exist and increasing them by the importation of likely parasites from abroad." The native checks which already exist have been touched upon already, and it may be said that the work of our Mycologist in preparing, artificially, cultures of the fungus parasite and distributing it will illustrate what I mean by the encouraging of such as do exist.

Apart from this parasite there are other enemies of the Bagworm. There are, for instance, at least two kinds of wasp parasites. These beneficial creatures do not abound to any great degree. Indeed, a careful examination of 2867 bags made twelve months ago showed that only one-half per cent. of the Bagworms had been destroyed by this agent. This, upon the face of it, is very disappointing, but the question will be at once asked: Can nothing be done to stimulate the activities of these two insects? The answer is: Theoretically, yes; practicably and economically, no.

Among the diptera we find an active agent, and at first sight a promising one, as—in the examination above alluded to—11 per cent. of caterpillars were obviously smitten by this parasite. But, as I have shown in the pages of this journal (p. 688, Vol. I), this fly is itself subject to the attack of a parasite, a circumstance which at once sets it at a discount and precludes, in both theory and practice, its encouragement.

There is no reason, however, against the practicability of introducing from foreign countries both wasp and fly parasites which attack similar Bagworms to this of the wattle, and until experiments are conducted along these lines no one can say that they are doomed to failure.

That Bagworms are subject to decimation at times by other diseases, presumably diarrhœtic troubles, has been observed, and several wattle growers express the force of this controlling agent when they say "plantations become Bagworm-sick." True, there is an opening here towards the encouragement of this useful ally, but many streams have to be crossed before any dogmatic assertion can be made, and at present it appears that to a very large extent the work of this controlling factor is dependent upon Nature's bounty. The work

done by European and American investigators into the "wilt" or "flacherie" diseases of caterpillars teaches us much, still they are as yet but sign-posts on the way.

Lastly, there are predatory animals. Birds undoubtedly play an important part in Bagworm suppression, and any measure to protect these feathered friends should meet with full encouragement. Their good work suggests the practicability of introducing and acclimatizing insectivorous birds of other lands; this is not a venture to be lightly undertaken, worthy as it is of full consideration.

There are very good reasons for believing that our parrots destroy a large number of Bagworms, crushing the caterpillars within the bags and extracting their juices. "Chuchs" or "weaver birds" are said to destroy them in a similar manner, and sprews have been credited by one observer (Miss Pegler) with tearing open the bags and destroying the worms.

I have endeavoured to obtain evidence from wattle growers as to the role played by birds, particularly sprews. Twenty-two growers state that they have never had any reason to suspect sprews of attacking Bagworms. Additional replies to my inquiries are:—

1. I do not think the sprews eat Bagworms. I have noticed the black tick bird in large flocks very busy in a young plantation infested with Bagworms, and the Bagworm practically disappeared from the same. These birds are very like sprews. I think there are very few birds that even trouble about eating Bagworms.

2. I cannot say whether sprews tear open bags, but they and starlings do consume an immense number of insects, especially locusts in the hopper stage.

3. Sprews are not common here. Large flocks of swallow-tailed shrikes are at times common in Bagworm-infested parts, and I have imagined them to be responsible.

4. Have noticed sparrows tearing the bags open, but not sprews.

5. There are two kinds of birds that are supposed to destroy the Bagworm—the chuck and another bird like it, but larger. I have seen this bird opening the bag to get the worm.

6. I have not suspected sprews of attacking Bagworm, but know that they do a lot of damage to crops.

7. Sprews do not attack Bagworms, but a similar bird (the gweekie) might.

8. Sprews do not attack Bagworms, but some other birds do.

Mr. F. Schroem (Dalton) writes as follows:—

"Some months ago you showed us some pictures in the *Agricultural Journal* of Bagworms, also the empty bags, which showed gaps at the top where some bird had torn the bag and taken the worm out. I remember you asked if any one could let you know what kind of a bird did this. Now, the other day I was walking through my plantations, which are full of Bagworms, and I noticed a swarm of chucks (as they are called here), and these were tearing the bags and extracting the worms in a wonderfully quick way and eating them, leaving the empty bag behind. I am sure these birds are exterminating thousands, indeed millions, of Bagworms yearly, and think they should be protected by law."

A most important enemy is one of whose work I have given some account in the *Natal Agricultural Journal* (p. 394, Vol. XIV, 1910).

This animal I have not the slightest hesitation in saying is a field rat, and most probably the white-nosed rat (*Mus concha*). The economy of this creature is practically unknown, but it has been captured in plantations where the beneficial influence was most pronounced. In view of the close watch that has been kept for it at work it is undoubtedly of nocturnal habits, and that it is a rodent is emphasized by the nature of the rents in the tough, silken bags.

This beneficial influence was alluded to in my first report upon the Wattle Bagworm (1901), and an account of the first most remarkable work that it had accomplished was given in the note quoted above, when it was found that eighty per cent. of the bags had been opened and the insect removed.

It may be well to relate here two subsequent observations. In the spring of 1911 a young plantation at Cramond became grossly infested with Bagworms, illustrating a very remarkable effect of wind-spread. At the time I thought of it as presenting a very favourable opportunity for testing the effect and cost of hand-picking; but, upon second thoughts, reserved it in my mind for future observations on the behaviour of the young upon hatching. In the spring of 1912 a visit was paid to the plantation with this idea in mind, and to my astonishment only a single old bag remained here and there upon the bulk of the trees, the majority being found upon those trees along the side which ran parallel to a railway line. The trees, at the time of the second inspection, averaged about 12 feet in height and throughout the plantation, except for some 15 or 20 feet in along the railway line, there was a rank growth of vegetation, dead and dry, from the winter.

The missing bags were found beneath the trees among the vegetation and every one torn open. Those from under thirteen trees were collected and numbered 710, the counts ranging from 15 to 111 per tree. The only insect-inhabitated bags to be found were upon the trees from beneath which the vegetation had been cleared for 15 to 20 feet in along the railway line as a precaution against fire; but these were indeed few in number in comparison with the infestation which had previously existed. To digress a little I would explain that in many orchards in Natal where weed growth is not kept down a good deal of winter injury results from rats which gnaw off the bark about the crowns. Upon rare occasions I have seen the soft bark high in a wattle tree similarly removed. One of my earliest friends in Natal (W. B. MacFie, jun.) said to me if the farmers would only clear the dead vegetation away from the bases of the trees for a few feet the rats which winter in the weed-grown orchards would not touch the trees. I asked him why and he said: "Well you see the rats only work at night and they will not cross the bare ground because they are frightened of the owls."

No better illustration of the truth of this "theory of a practical farmer" have I ever seen than the case under discussion, for the Bagworms were only left unmolested to any extent where the "cover" had been removed and where, if startled by an owl when feeding in the branches upon the Bagworms, they could not drop immediately into cover.

As the canopy of a wattle plantation increases, of course vegetation below the trees becomes less and less until none grows at all. Here no doubt is the reason for the very obvious fact that in such trees the work of this benign agent is less remarkable than in young plantations where vegetation of some sort usually abounds.

A further observation bearing upon this matter was also made at Cramond, but the circumstances are slightly different. One plantation, fairly well infested with Bagworm, was thinned about August, shortly prior to the emergence of the young. The fallen trees (some fifty per cent.) were stripped in the usual way and the tops allowed to wither upon the ground. Naturally the bulk of the infestation of these trees was upon the now procumbent tops and close to the ground. An examination showed that whilst the insects in the standing trees were unmolested those upon the fallen tops were annihilated by the tearing marauder. Fortunately the attendant circumstances helped to confirm the earlier observation, because the bulk of the tops had been drawn and piled to one edge of the plantation, and in these piles the bags were all torn. As one went further into the plantation where the tops were fewer and more scattered the percentage of torn bags went down from 100 to 50, showing clearly that the less the cover afforded the more chary the animals—presumably rats—were in venturing afield.

## GROSS INFESTATIONS.

So much use has been made of the term "gross infestation" that it is well to point out here what is thereby implied. Often in discussing Bagworm attack [24] I endeavoured to indicate how ordinarily the infestation of a plantation culminated in a gross attack and how this occurred when the trees were arriving at maturity. During the spring of 1911 and 1912 gross infestations of juvenile plantations were quite common in the New Hanover Division, and these have given rise to considerable alarm.

Such gross infestations of young plantations are a feature of Bagworm attack which may have occurred previously of course, but they could not have been anything remarkable, because I had neither seen nor heard of any attack of this nature before 1911, and I do not know of any wattle grower upon whose notice such a state of affairs has been forced. Reverting to the correspondence which I have already drawn upon so largely, I find that there is a very general agreement among planters that the gross infestation of juvenile plantations is an unusual circumstance and of recent date. The following are a series of answers to the two inquiries:—

(*a*) Is it usual or unusual for young plantations to be badly infested?
(*b*) At what age are plantations grossly infested?

1. (*a*) Unusual.
   (*b*) No gross infestation has occurred here (3500 to 4500 feet).
2. (*a*) No.
   (*b*) No gross infestation has occurred here (4500 feet).
3. (*a*) It does happen, but can scarcely be termed usual.
   (*b*) Five to seven years.
4. (*a*) Unusual.
   (*b*) Seven to ten years.
5. (*a*) Unusual. I have never seen one about here.
6. (*a*) Unusual.
   (*b*) Six to nine years, but younger plantations are badly attacked now.

[24] With wattle growers.—C F.

7. (*a*) Have just noticed it for the first time.
(*b*) Five to six years.
8. (*a*) Have never had a case where young plantations were infested.
(*b*) Five years and upwards.
9. (*a*) Unusual.
(*b*) Five to seven years.
10. (*a*) Unusual.
(*b*) Have never had a gross infestation.
11. (*a*) Have never had Bagworms in plantations before trees four years old.
(*b*) Four to seven years.
12. (*a*) Unusual.
(*b*) Five to seven years.
13. (*a*) Unusual.
(*b*) Five to seven years.
14. (*a*) Unusual.
(*b*) Four years and onwards.
15. (*a*) Unusual.
(*b*) Have never experienced a gross infestation.
16. (*a*) Unusual.
(*b*) Three to four years.
17. (*a*) Unusual.
(*b*) Seven years.
18. (*a*) Unusual.
(*b*) Four years and onwards. (This year, 1912, my yearling trees are full.)
19. (*a*) Unusual.
(*b*) Six to seven year trees suffer most. [In New Hanover District young trees have been left without a leaf the last two years (seasons 1910-11, 1911-12).]
20. (*a*) Unusual.
(*b*) Four to seven years. (My own young plantations have not been badly infested, but I have seen those of others badly so.)
21. (*a*) Unusual, except where they immediately adjoin old trees.
(*b*) Five to seven years.
22. (*a*) Unusual.
(*b*) Six to eight years.
23. (*a*) We have not had a plantation under four years really badly infested.
(*b*) Six to eight years.
24. (*a*) Unusual.
(*b*) Five, six, and seven years and old stunted trees sown broadcast.
25. (*a*) Very unusual.
(*b*) Six years and onwards.
26. (*a*) Unusual.
(*b*) Six years and onwards.
27. (*a*) It is only within the last few years that Bagworm has appeared on trees under four years of age. Now, however, they may be seen abundantly on trees during the first and heavy infestation during the second year.
(*b*) Fifteen to twenty years ago from four years onwards. Now at any age.

From the foregoing I have eliminated several replies which are based upon recent events, and but confirming the fact that gross infestation of young plantations is of recent origin.

The "usual" gross infestation, or that which occurs when the trees are four years and upwards of age (chiefly five to seven years as seen from the foregoing evidence), is mainly due to breeding up, and incidentally, of course, to slight augmentation of numbers from year to year from outside sources. In the past, from my own observations, young plantations were but lightly infested. Upon several occasions I found that in trees of eighteen months' growth the original infestation was about one Bagworm to every ten trees. At a 6 × 6 foot espacement a low estimate would be 100 insects per acre, and one might put the rate of spread from outside sources to a given plantation at 100 for each year of its existence. As a plantation grows larger, however, the rate of annual infestation from outside sources is likely to increase rather than to decrease. A calculation upon this basis will serve to illustrate the potency of the insect.

Careful counting shows that each female produces about 600 young,(25) and there is about the same proportion of males and females. Let us then follow the rate of increment of 50 couples:—

Age of plantation, 18 months, present 50 couples.
,, ,, 2 years, from 50 couples, 30,000 young.
,, ,, 3 ,, ,, 15,000 couples, 9,000,000 young.
,, ,, 4 ,, ,, 4,500,000 couples, 2,700,000,000 young.

The progeny of the insects reaching the plantation subsequently will considerably affect this huge total, and a very modest estimate of an unchecked increment would give us a total of nearly four thousand millions of insects to account for a gross infestation after three years have elapsed.

The heaviest infestation (26) which I have myself observed closely was that at Cramond in the season 1911-12 where a block of trees was so grossly infested that the insects when half-grown starved to death for want of food, and, travelling to the ground, they succumbed. Several patches throughout the plantation were examined, and I arrived at the conclusion that there were not more than two insects at most to every square inch of soil surface; or, in other words, twelve and a half million to the acre. Large as this figure is, it is only one-two-hundredth part of the natural increment of fifty pairs for four years, or, to put it even more graphically, less than a quarter of the unchecked increment of a single pair in three to four years:—

Age of plantation, 18 months, 1 pair per acre = 2
,, ,, 2 years, 300 pairs per acre = 600
,, ,, 3 ,, 300 × 600 ,, = 180,000
,, ,, 4 ,, 90,000 × 600 ,, = 54,000,000

(25) In my first report (1901) the number of eggs given per female is 1600. This is perhaps an error. At the same time I have old spirit specimens of females which are much larger than those recently observed. The counts made in 1912 varied from 500 to 700, and the number of eggs may be very largely a matter of nutrition.

(26) The damage done by this outbreak was very severe, despite the fact that the insects finished feeding in January. The trees after ten months made practically no recovery, but it is to be recollected that the autumn was extremely dry and the spring rains late in coming. With good autumn rains no doubt a considerable recovery would have been made.

Not alone do these figures show how simply a gross infestation may arise in a very short period from the advent into a plantation of a few Bagworms, but they force home upon us the enormous pressure Nature herself brings to bear against the ascendancy of this species despite the natural advantages for its numerical ascendancy which the endeavour of man has provided.

The "unusual" gross infestation of juvenile plantations is in itself extraordinary, and is, I think, fairly attributal to climatic mutations. The data in my possession is, unfortunately, meagre, but such as it is, it indicates that for the past two seasons main hatchings have occurred somewhat earlier than formerly. It is my idea that these infestations are traceable to the greater exposure of the young to the strong land winds which prevail in the spring and herald the advance of our summer rains. It must be admitted that just where these gross infestations of juvenile plantations have occurred the area under wattles has been rapidly extending for years past, and this, no doubt, accounts for the number of instances suddenly coming under notice. Further, it may be expected as a more general feature as time goes on with wattle planting ever on the upward grade.

What such gross infestations amount to in all cases, I cannot say, but in two the number of Bagworms upon twelve-month-old trees ranged from 40 to 60 per tree, whilst upon a fifteen-month-old plantation the average was 21 per tree. The plantation last referred to was a narrow one, and the actual counts for seventeen consecutive 5 feet to 9 feet trees were: 20, 30, 21, 28, 13, 18, 11, 10, 34, 37, 20, 5, 12, 30, 15, 24, 28. In this case the sizes of the bags varied and the degree of infestation appeared to be due to a gradual accumulation either for two or three wind-spreads during the one spring. In other cases it has been noticed that the infestation appeared to arise from a general peppering of the plantation with larvae of one age.

I am not in a position to discuss or indicate the absolute outcome of such infestations because in those which were held under observation the insects were removed and left no progeny. In one case they were hand-picked; in the other they were all destroyed by field rats as already described. In the several cases mentioned, the plantations were again heavily infested this spring by wind-spread insects (1912) from neighbouring trees, and it is necessary to mention this lest the observation regarding the effect of the natural check be challenged. It is well, however, to point out that in many cases wind-spreads are much more potential because they may be far afield from plantations where native checks abound and so that the Bagworms enjoy considerable immunity before being found by their enemies.

*(To be continued.)*

# **Wireworm** (*Strongylus* or *Haemonchus contortus*).

## THE STOMACH WORM OF SHEEP AND GOATS.

By R. W. Dixon, M.R.C.V.S., Senior Veterinary Surgeon, Cape Province.

This parasite, which is so prevalent amongst sheep and goats in South Africa, at times causes great mortality. It infests the fourth stomach of sheep and goats principally, but may be found also in cattle and various wild ruminants.

The presence of these worms in the stomach results in the irritation of the mucous membrane, causing disturbance of digestion and resulting malnutrition; moreover, the worm is a blood sucker and the blood-sucking habit results in anaemia of the affected animal, causing it to become feeble and thin. More especially are lambs and young sheep affected seriously, but often fully grown sheep, although badly infested, provided the veld is in good order, may show no apparent symptoms of the disease.

### Symptoms.

The general symptom is a pernicious anaemia shown by loss of flesh, weakness, debility, thirst, and diarrhœa. The mucous membrane of the eyes and mouth are pale and bloodless, and in the advanced stages a dropsical effusion appears under the skin of the lower jaw and abdomen.

A post-mortem examination will reveal the presence of the parasites wriggling about in the fluid contents of the fourth stomach about 1½ to 1¾ inch long, and about as thick as an ordinary pin.

Its distinguishing name, Contortus, is given to it because it has a red and white spiral appearance like a barber's pole. "This arises from the arrangement of its ovarian tubes, which are rolled around the intestine to form regular loops, the intestine being straight and of a red colour. It subsists on the blood it abstracts from the mucous membrane, and to this it owes its brown colour." (Neuman.)

### Life History of the Wireworm.

"According to the investigations of C. Raillet, the *Strongylus contortus* is ovi-viviparous (that is the eggs contain living embryos before being discharged from the parent worm, and these embryos, which they produce, will not develop in pure water, but die in the course of a few weeks.

"Leuckart reports that he has seen them growing rapidly in muddy water, however, and after several moultings reach a state of development in which they were capable of being completely perfected in ruminants."

From investigations carried out by officials of the U.S.A. Bureau of Animal Industry, it appears that the worms in the stomach produce eggs of microscopic size, which pass out of the body of their host in the droppings and are thus scattered broadcast over the pasture,

The eggs require a temperature above 40° F. to hatch out, taking from a few hours to two weeks according as the temperature is high or low; when the temperature is below 40° F. the eggs remain dormant, and in this condition retain their vitality for two to three months. Freezing or drying soon kills the unhatched eggs.

The tiny worm (known as embryo) which hatches from the egg feeds upon organic matter in the droppings and grows until it is nearly one-third of an inch in length. During this process the skin is moulted and the embryo becomes completely encased in its former cuticle; it is then in its sheathed stage. The young worms which have reached this stage are ready to be taken into the body; they are greatly resistant to cold or dryness, and will stand repeated freezing, and they have been kept in a dried condition for thirty-five days, afterwards reviving when moisture was added.

Further development ceases until the worm is swallowed by a sheep or other ruminant, after which it again begins to grow, and reaches maturity in the fourth stomach of its host in from two to three weeks.

The fact that they crawl up blades of grass whenever sufficient moisture exists, such as dew, rain, or fog, increases the chances of these young worms being swallowed.

It has been found that pasture on which no sheep, goats, or cattle have been allowed to graze for a year will be practically free from infection. The time required for clean pasture to become infectious after infested sheep or goats are placed upon it, depends upon the temperature assisting the eggs of the parasite contained in the droppings to hatch out and the young worms to develop to the sheathed stage, the stage when if swallowed they continue their development.

This final stage is reached after the eggs have passed from their host—from three to four days to three or four weeks according to the temperature.

The eggs or newly hatched worms if swallowed are not capable of development.

### PREVENTIVE TREATMENT.

In America, methods have been adopted with more or less success to prevent infection of sheep and also to cleanse the pasturage by starving the young worms out. This is done by means of rotation of pasture and repeated dosing, at the same time taking care to keep the sheep away from stagnant water contaminated with fæces and giving them a plentiful supply of clean drinking water.

In this country the stock-farming conditions are not generally suited for the adoption of the rotation of pasture method, for in order to carry it out properly the stock-owner must make provision to have some veld at his disposal which has not been grazed over by ruminants for at least nine to twelve months, so that the flock infested with wireworm can be turned on to clean veld shortly after being dosed. Where there is no clean veld available, and sheep are likely to soon become infested, it is desirable to dose repeatedly with drugs known to expel worms.

### CURATIVE TREATMENT.

In South Africa a solution of sulphate of copper (bluestone) has been found to give the most satisfactory results as a vermifuge for

this parasite, but it is well known that the drenching of sheep and goats with strong solutions of sulphate of copper is frequently followed by fatal results (mainly due to faulty dosing, causing traumatic pneumonia) unless great care is taken in the operation of dosing. For lambs and kids it is found safer to give a weaker solution than that administered to grown-up animals. The following are the doses recommended:—

*For Lambs.*—Take 1 lb. (avoirdupois) pure bluestone, 1 lb. Colman's mustard (fresh), 12 gallons of rain-water. *Dose*: 3 to 6 months' old, give 2 ounces; 6 to 9 months' old, give 3 ounces; 9 to 12 months' old, give 3½ to 4 ounces.

*For Sheep and Goats.*—Take 1 lb. (avoirdupois) bluestone, 1 lb. Colman's mustard (fresh), 10 gallons of rain-water. *Dose*: 12 to 18 months, give 4 ounces; 18 months and over, give 5 ounces.

The bluestone should be clear blue crystals with no white patches or crusts, and should not be dissolved in an iron or galvanized iron vessel. An enamelled bucket, such as is used for milking purposes, answers admirably, and rain-water, if procurable, should be used for making the solution.

Fast the flock from twenty to twenty-four hours before dosing and keep them away from water twenty-four hours after they are dosed. It is important that the bluestone and water be accurately weighed and measured, and that a measure glass be used to measure the graduated doses. In dosing both sheep and goats, it is preferable to do them standing on all four legs. It has been found by experiment that if the dose is taken quietly most of it will pass directly to the fourth stomach when the animal is dosed in the standing position, and when the animal is placed on its haunches only a part of the dose passes immediately to the fourth stomach.

Many sheep and goats are killed by careless dosing; therefore, when the animal bleats or coughs, more especially goats, stop pouring and lower the head at once, otherwise the fluid will enter the larynx and descend to the lungs.

*Arsenic-Bluestone Solution Treatment.*

Dosing with arsenic has been found in Australia to have obviously good effects upon stomach and intestinal worms, and, as far as can be judged, has no detrimental action whatever on the sheep.

It is also noticed that sheep suffer considerably in condition for some time after from the drastic effects of strong solutions of bluestone, thereby not allowing of a second dose being repeated, and as it is advisable to repeat the dose at least within an interval of one month when sheep and goats are badly infected, the following mixture can be repeated with safety:—

Take ½ lb. (avoirdupois) Cooper's Dip powder, ½ lb. (avoirdupois) bluestone, 10 gallons rain-water.

First dissolve the bluestone in a quart of hot water, then mix the dip with a sufficient amount of water to make a paste in order to break down the small lumps; then add sufficient water to make up the 10 gallons.

*Dose*: For full grown sheep, 4 to 5 ounces of mixture; for 12 to 18 months' old sheep, 3 to 4 ounces of mixture; for 9 to 12 months' old sheep, 2 to 3 ounces of mixture; for 6 to 9 months' old sheep, 1½ to 2 ounces of mixture; for 3 to 6 months' old sheep, 1 ounce of mixture.

Keep the mixture well stirred whilst dosing.

The same precautions should be taken in dosing animals as are recommended for the bluestone solution.

Many farmers in the Border Districts of the Cape Province dose their sheep with dry powdered bluestone, giving a dose from 10 to 15 grains dry on the tongue after fasting for twelve hours, and taking the precaution to keep the flock from water during the day they are dosed. Small spoons are made to hold the different doses required.

Dr. Theiler recently carried out a number of experiments by dosing sheep with a mixture of Cooper's Dip and bluestone, given dry, and recommends the following doses which he found could be given with safety at weekly intervals for ten weeks:—

*Sheep.*—4 to 8 teeth, 10 grains Cooper's Dip, 10 grains bluestone; 2 teeth, 7 grains Cooper's Dip, 7 grains bluestone.

*Lambs.*—6 to 9 months' old, 5 grains Cooper's Dip, 5 grains bluestone.

1 lb. (avoirdupois) of a mixture of equal parts Cooper's Dip and powdered bluestone contains 7000 grains, which is sufficient to dose 350 full grown sheep, 500 young sheep, and 700 lambs. Special spoons to hold the different doses are needed.

### PREVENTIVE LICKS.

As a preventive, licks composed as follows have been found very effective for wireworms and all kinds of worms:—

1. Powdered sulphate of iron, 1 part; flowers of sulphur, 1 part; powdered slaked lime, 1 part; common salt, 5 parts.
2. Cooper's Dip, 1 part; powdered bluestone, 1 part; flowers of sulphur, 3 parts; slaked lime, 3 parts; common salt, 30 parts.

# Recent Soil Investigation in the Cape Province.

By Dr. C. F. Juritz, M.A., F.I.C., Chief Chemist, Cape Province.

*(Continued from page 870, Vol. V.)*

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## Cathcart.

No. 77 represents a sour soil from the Boutebok Flats. No. 78 is a sample of very wet and swampy soil in a valley, on the farm Glenfinlas, south-west of the village of Cathcart, and was taken from sour veld which had been under cultivation for about five years. Irrigation had never been needed; in fact, the site being very level, the great difficulty had been that of adequate drainage. The area represented covers about 200 acres and had never been manured. It had been cultivated with oats, and it had been found capable of producing excellent potatoes if supplied with large quantities of kraal manure. Under cereal crops the soil proved capable of forming good straw, but the grain did not fill up as it should. Six samples of virgin soil typical of the predominating sandy and red soils of that district* were collected on the farm Hove, Toise River. Of these, No. 79, from a hill-side, was a reddish-brown loamy surface soil, not less than 10 feet deep, and No. 80 a more clayey sub-soil taken below the former sample. The veld affords good grazing, and is about three-fourths sour and one-fourth sweet grass; wheat and rape thrive best. No. 81 represented a very dark grey soil on which long coarse grass grows from a valley the sub-soil whereof is represented by No. 82. Wheat, barley, and potatoes do well here. These two soils are similar in structure to Nos. 79 and 80. No. 83 was a greyish sandy surface soil (mixed grass veld) and No. 84 its sub-soil, the latter of which had the larger proportion of clay. These two soils were lighter in colour than Nos. 81 and 82. No satisfactory crops were obtainable here unless the soil was well fertilized, and steenbok zuuring (*Rumex acetosella*) flourishes wherever it is not kept in check.

A partial mechanical analysis of the last six soils resulted as follows:—

| No. | Pebbles > 3 mm. | Gravel and Coarse Sand 3 — ·5 mm. | Fine Earth < ·5 mm. | Nature of Pebbles and Gravel. |
|---|---|---|---|---|
| 79 | Nil | ·07 | 99·93 | Magnetite and quartz grains. |
| 80 | Nil | ·11 | 99·89 | „ „ |
| 81 | Nil | ·04 | 99·96 | Quartz, magnetite, and ferruginous sandstone. |
| 82 | Nil | ·01 | 99·99 | Quartz grains. |
| 83 | ·08 | ·10 | 99·82 | Ferruginous sandstone, quartz, and little magnetite. |
| 84 | ·14 | ·10 | 99·76 | |

* Further north, in the Thomas District, the soils appear to be a mixture of sandy and dark alluvial.

The results of the chemical analyses were as follows:—

| No. | Percentage of Field Sample. | Percentage of Soil sifted through 1 mm. Sieve. | | | | Percentage of Soil sifted through ½ mm. Sieve. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fine Earth below ½ mm. | Water. | Organic Matter. | Chlorine. | Nitrogen. | Lime. | Magnesia. | Potash. | Phosphoric Oxide. |
| 77 | 95·23 | ·89 | 2·83 | ·002 | ·118 | ·119 | — | ·058 | ·057 |
| 78 | 99·83 | 1·32 | 4·68 | ·017 | ·136 | ·110 | — | ·021 | ·063 |
| 79 | 99·93 | 2·21 | 6·05 | ·0227 | ·186 | ·028 | ·012 | ·077 | ·041 |
| 80 | 99·89 | 2·25 | 5·47 | ·0234 | ·144 | ·020 | ·012 | ·085 | ·037 |
| 81 | 99·96 | 1·43 | 4·11 | ·0241 | ·161 | ·040 | ·022 | ·066 | ·006 |
| 82 | 99·99 | 1·28 | 3·49 | ·0224 | ·130 | ·034 | ·004 | ·073 | ·010 |
| 83 | 99·82 | 3·76 | 2·24 | ·0217 | ·102 | ·026 | ·010 | ·055 | ·015 |
| 84 | 99·76 | ·64 | 1·63 | ·0231 | ·140 | ·028 | ·004 | ·057 | ·006 |

In the last six soils the total percentages of water-soluble salts were determined, and found to be as follows :—

| No. | Total soluble salts. |
|---|---|
| 79 | ·074 |
| 80 | ·060 |
| 81 | ·072 |
| 82 | ·046 |
| 83 | ·044 |
| 84 | ·044 |

The soil represented by sample No. 77 possesses a moderate reserve of phosphates but is poor in potash, while nitrogen and lime are present in fair amount. No. 78 is a similarly constituted soil, except that it has a better supply of nitrogen. The six Hove soils appeared to have been derived from a fine-grained, highly ferruginous sandstone; they contained very little coarse material, and were rather stiff; in other ways their physical condition was excellent. The amount of moisture, as usual in soils that are not very clayey, was low; the proportion of organic matter was not high, but there were nevertheless in some instances fairly considerable amounts of nitrogen. The proportions of brack salts were low, and, as far as examination of merely surface samples can form a criterion, the condition seems in this respect quite satisfactory. The amounts of lime in these six soils are inadequate, and the proportions of phosphoric oxide exceptionally low, particularly in the last four samples. The percentages of potash, though fair, are inclined to be low, especially in Nos. 83 and 84, but in this respect the condition is not so wholly unsatisfactory as in regard to the lime and phosphoric oxide.

Results such as these suggest the employment in considerable amount of a fertilizer which will supply the deficiency of both lime and phosphoric oxide, like basic slag, while potash fertilizers could also be used with special advantage in the case of Nos. 83 and 84, which would be further improved if their content of organic matter (humus) were increased. It was therefore suggested that for a crop

like wheat or oats basic slag should be applied at the rate of 200 lb. per acre, and *about a fortnight later* 100 lb. of Government guano. The application of kraal manure and good cultivation would do much to enrich the soil in humus, and would assist in increasing the availability of the plant food present in the soil.

## CERES.

The locality from which the four Ceres soils, Nos. 85, 86, 87, and 88 were taken is surrounded by hills and rocky sandstone mountains; the surface soil is generally gravelly, with a tough or clayish sub-soil of good depth, very dry in summer, but cold and rather wet in winter. The vegetation consists of rhenoster bush (*Elytropappus rhinocerotis*), which has often been pointed out as a characteristic of poor soil,* and sour veld (poll grass). No. 85 represents a mixed surface soil, taken from various parts of the farm The Oaks, and No. 86 was a sub-soil from the same farm. No. 87 was a mixed surface soil from the farm Klipfontein, and No. 88 a similar mixed sample collected on the farm Zwaarmond. Nos. 85 and 96 were of a greyish colour. Geologically, these four soils consisted of disintegrated slate and fine-grained sandstone, generally ferruginous, but in part also micaceous; ferruginous sandstone pebbles were mixed up with the soil. No. 87 in addition contained a small quantity of quartz grains, and No. 88 a larger proportion of slate. The results of the analyses were as follows:—

| No. | Percentage of Field Sample. | Percentage of Soil sifted through 1 mm. Sieve. | | | | Percentage of Soil sifted through ½ mm. Sieve. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fine Earth below ½ mm. | Water. | Organic Matter. | Chlorine | Nitrogen. | Lime. | Magnesia. | Potash. | Phosphoric Oxide. |
| 85 | 81·4 | ·90 | 3·18 | ·007 | ·091 | ·063 | — | ·039 | ·082 |
| 86 | 70·6 | ·87 | 3·00 | ·011 | ·084 | ·053 | — | ·034 | ·072 |
| 87 | 81·8 | ·97 | 3·81 | ·004 | ·098 | ·054 | — | ·086 | ·085 |
| 88 | 87·4 | 1·64 | 5·49 | ·006 | ·175 | ·175 | — | ·074 | ·081 |

All these soils are chemically poor, and stand in need of general manuring. In this connection reference may be made to my previous remarks on the soils of the Ceres Division, including those from the farm The Oaks, in "Agricultural Soils of Cape Colony," pp. 50 and 51.

## CLANWILLIAM.

Nos. 89 and 90 were collected on the farm Zeekoevlei; the former, a light-coloured, sandy soil, from land where corn, oats, and barley had been sown with very poor results; inferior crops of oats and barley resulted, while the corn appeared only in patches. It had

* See "Agricultural Soils of Cape Colony," pp. 56, 68, 96, and 102.

been manured with Government guano. No. 90 was a soil similar in appearance to the foregoing, but from rye lands which had answered fairly well, though not quite satisfactorily. It had been fertilized by means of superphosphates.

No. 91 was collected on the farm Damplaats, near Pakhuis, from a level stretch of ground which had never been under cultivation or manured. In sampling, the surface accumulations had been scraped away and the sample taken to a depth of 12 inches. Tobacco grown on similar soil in the vicinity had not always been found to possess good burning qualities.

The analyses of these three soils resulted as follows:—

| No. | Percentage of Field Sample. | Percentage of Soil sifted through 1 mm. Sieve. | | | | Percentage of Soil sifted through ½ mm. Sieve. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fine Earth below ½ mm. | Water. | Organic Matter. | Chlorine. | Nitrogen. | Lime. | Magnesia. | Potash. | Phosphoric Oxide. |
| 89 | 81·1 | ·13 | ·80 | ·010 | ·021 | ·015 | ·004 | ·006 | ·015 |
| 90 | 78·1 | ·05 | ·30 | ·004 | ·014 | ·013 | ·004 | ·005 | ·009 |
| 91 | — | ·40 | 1·52 | ·0035 | ·154 | ·031 | — | ·031 | ·017 |

The amounts of soluble salts in Nos. 89 and 90 were:—

| No. | Total soluble salts. |
|---|---|
| 89 | ·024 |
| 90 | ·016 |

Partial mechanical analyses of these two soils resulted as follows:—

| No. | Pebbles, >3 mm. | Gravel and Coarse Sand, 3–·5 mm. | Fine Earth, < ·5 mm. |
|---|---|---|---|
| 89 | 2·0 | 16·9 | 81·1 |
| 90 | ·2 | 21·7 | 78·1 |

The residues on the sieves in the mechanical analyses showed these soils to be made up of ferruginous sandstone and quartz, and the results of the chemical analyses showed a corresponding deficiency in plant food. Both soils were remarkably poor in this respect, the plant food constituents being, in fact, all but entirely absent. This is just what may be expected of soils possessing the physical characters which these possess. From such soils the soluble constituents are easily leached out, and even water itself can scarcely be retained in a soil consisting almost entirely of coarse sandstone and quartz grains, and consequently very porous. In order to be fit for use such soils

need to be kept moist and fertilized at frequent intervals, and the poor results obtained from cultivation of the particular soils under consideration are due to these features.

No. 91, though to a less extent, also shows the characteristic poverty in all inorganic plant food that is usually exhibited by Malmesbury series soils situated in localities untraversed by limestone bands. The addition of kraal manure to a soil poor in inorganic plant food such as this would tend to increase the nitrogen out of proportion to the potash, and in so doing accentuate the badly burning propensities of the tobacco leaves. At the same time the soils 89 and 90 seemed badly in need of humus, and in such a case heavy dressings of farmyard manure or kraal manure would better aid in remedying their prominent defects than the addition of artificial fertilizers. Failing farmyard manure, the ploughing in of green manuring crops like lupins or cowpeas would be advantageous; then if the inorganic fertilizing constituents of the soil were still deficient they could be dealt with subsidiarily to the main desideratum of soil enrichment in organic matter.

## COLESBERG.

Analyses of six samples of soil from the farm Oorlogspoort, in the Field Cornetcy of Upper Hantam, Colesberg Division, were recorded on page 52 of my "Study of Agricultural Soils of Cape Colony." No. 92 was another sample from the same farm, well supplied with plant food, and not materially different in composition from No. 4 of the previous series. The results of its analysis were as follows:—

| No. | Percentage of Field Sample. | Percentage of Soil sifted through 1 mm. Sieve. | | | | Percentage of Soil sifted through ½ mm. Sieve. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fine Earth below ½ mm. | Water. | Organic Matter. | Chlorine. | Nitrogen. | Lime. | Magnesia. | Potash. | Phosphoric Oxide. |
| 92 | 87·9 | 4·44 | 7·44 | ·003 | ·196 | ·540 | — | ·308 | ·201 |

No. 93, a sample of doleritic soil, was taken from the banks of a "sloot" on the farm Olivewood. The soil had exhibited a peculiar tendency to "sweat" in patches, and even in the sunshine such damp patches would appear on the surface and along the sides of "sloots." Ordinary indications of brack were absent. The following percentages of water-soluble salts were found in this soil:—

| No. | Sodium Chloride. | Sodium Sulphate. | Sodium Carbonate. | Total Alkali Salts. | Magnesium Chloride. | Magnesium Sulphate. | Magnesium Carbonate. | Calcium Chloride. | Calcium Sulphate. | Calcium Carbonate. | Total soluble salts by analysis. | Total soluble salts by weighing. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 93 | ·033 | Nil | Nil | ·033 | ·031 | Nil | Nil | Nil | ·037 | ·012 | ·304 | ·312 |

In addition to the constituents tabulated above, this soil contained .105 per cent. of calcium nitrate and .086 per cent. of magnesium nitrate. To the presence of these hygroscopic nitrates and the chloride of magnesium the sweating tendency was most probably due.

## CRADOCK.

No. 94, collected at Roodewal, was a light yellow very clayey Karroo soil which had been under cultivation, but, though kraal manure is generally used in the district, this particular soil had not been manured and is said to have yielded poor returns of wheat and oats. The surface soil was 18 inches deep, with 8 feet of greyish friable sub-soil below. Water from the Pauls River had been used for irrigation, and white alkali spots are said to have been noticed on the soil at times. The analyses resulted as follows.

No. 95 was collected on the farm Eerste Verlies, on the Vlekpoort River, and was intended for lucerne cultivation. The analyses of these two soils resulted as follows:—

| No. | Percentage of Field Sample. | Percentage of Soil sifted through 1 mm. Sieve. | | | | Percentage of Soil sifted through ½ mm. Sieve. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fine Earth below ½ mm. | Water. | Organic Matter. | Chlorine | Nitrogen. | Lime. | Magnesia. | Potash. | Phosphoric Oxide. |
| 94 | 89·26 | 3·56 | 4·16 | ·015 | ·021 | 1·132 | ·859 | ·300 | ·125 |
| 95 | 100 | 1·11 | 1·86 | ·005 | ·056 | ·640 | -- | ·070 | ·057 |

No. 94 yielded .102 per cent. of total soluble salts on extraction with distilled water.

A partial mechanical analysis gave the following figures:—

| No. | Pebbles. > 3 mm. | Gravel and Coarse Sand, 3—·5 mm. | Fine Earth, < ·5 mm. | Nature of Pebbles and Gravel. |
|---|---|---|---|---|
| 94 | 2·30 | 8·44 | 89·26 | Almost entirely grey slate. |

This soil, which was apparently derived from weathered slates, furnishes an instructive example of the manner in which a soil containing satisfactory amounts of the different plant foods, and therefore apparently all that can be desired from a *chemical* point of view fails in productiveness because the *physical* condition of the soil is defective. In this case the soil, though rich in lime, magnesia, and potash, together with quite satisfactory proportions of phosphates, gave poor results, obviously on account of its stiff, clayey nature. It seemed to require opening up more than anything else. It is true that the amount of nitrogen was low, but admixture of organic matter could remove this defect. The ploughing in of green peas was recommended with this object, as well as the addition of straw or stable

manure to open the soil, permit of easy access of air and moisture, and so improve the general texture of the soil and so prevent its caking, which is highly detrimental to plant growth.

The soil represented by No. 95 is well supplied with lime, but is poor in the other constituents of plant food. As the land was to be used for lucerne growing the application of phosphatic and potassic fertilizers was advised.

## EAST LONDON.

Of the fourteen Gonubie Park soils (Nos. 96 to 109), Nos. 96 and 97 were respectively a surface soil and its sub-soil from the experimental camp. The next six soils were taken from the Gonubie lands; of these Nos. 98 and 99 were respectively a light surface and sub-soil. Nos. 100 and 101 were similarly a surface soil and its sub-soil from the south-eastern corner of the lands, and Nos. 102 and 103 surface and sub-soil respectively from the south-western corner. No. 104 was a surface soil from the orange lands, and No. 105 its sub-soil. The remaining four soils of the series were collected from Barber's Kloof, Nos. 106 and 107 being a surface and sub-soil respectively, taken at the drift, and Nos. 108 and 109 a surface and a sub-soil taken 100 yards south of the drift. At Barber's Kloof there is a very remarkable shell deposit, extending over probably five or six acres at depths varying from six inches to three feet from the surface. The usual agricultural chemical analyses yielded the figures shown in the following table:—

| No. | Percentage of Field Sample. | Percentage of Soil sifted through 1 mm. Sieve. | | | | Percentage of Soil sifted through ½ mm. Sieve. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fine Earth below ½ mm. | Water. | Organic Matter. | Chlorine. | Nitrogen. | Lime. | Magnesia. | Potash. | Phosphoric Oxide. |
| 96 | 99·8 | ·94 | 2·42 | ·008 | ·105 | ·032 | — | ·037 | ·039 |
| 97 | 99·6 | 1·05 | 2·17 | ·007 | ·070 | ·050 | — | ·046 | ·031 |
| 98 | 99·8 | ·60 | 1·64 | ·007 | ·060 | ·013 | — | ·022 | ·022 |
| 99 | 99·8 | ·59 | 1·21 | ·007 | ·040 | ·009 | — | ·031 | ·025 |
| 100 | 99·8 | 2·01 | 4·74 | ·010 | ·147 | ·066 | — | ·078 | ·051 |
| 101 | 99·5 | 2·12 | 4·21 | ·006 | ·091 | ·123 | — | ·059 | ·041 |
| 102 | 99·8 | 1·83 | 3·91 | ·008 | ·119 | ·131 | — | ·109 | ·066 |
| 103 | 99·7 | 2·26 | 3·56 | ·006 | ·112 | ·171 | — | ·082 | ·063 |
| 104 | 100 | 2·37 | 4·53 | ·005 | ·154 | ·218 | — | ·085 | ·052 |
| 105 | 99·9 | 3·06 | 4·78 | ·003 | ·133 | ·270 | — | ·083 | ·065 |
| 106 | 99·6 | 1·17 | 3·07 | ·003 | ·126 | 2·400 | — | ·036 | ·154 |
| 107 | 92·9 | 1·08 | 3·46 | ·002 | ·098 | 4·600 | — | ·030 | ·124 |
| 108 | 97·4 | 1·14 | 5·37 | ·003 | ·133 | 7·750 | — | ·029 | ·200 |
| 109 | 85·0 | 1·44 | 3·48 | ·003 | ·119 | 8·800 | — | ·027 | ·187 |

Partial mechanical analyses of these soils resulted in the figures given in the following table:—

| No. | Pebbles, > 3 mm. | Gravel. | | Coarse Sand, 1–·5 mm. | Fine Earth, < ·5 mm. |
|---|---|---|---|---|---|
| | | Coarse, 3–2 mm. | Fine, 2–1 mm. | | |
| 96 | Nil | Nil | ·09 | ·07 | 99·84 |
| 97 | ·04 | ·02 | ·19 | ·13 | 99·62 |
| 98 | Nil | ·01 | ·09 | ·09 | 99·81 |
| 99 | Nil | ·02 | ·12 | ·08 | 99·78 |
| 100 | Nil | ·01 | ·04 | ·14 | 99·81 |
| 101 | Nil | ·01 | ·15 | ·37 | 99·47 |
| 102 | Nil | ·01 | ·07 | ·13 | 99·79 |
| 103 | Nil | Nil | ·10 | ·21 | 99·69 |
| 104 | Nil | ·01 | ·02 | ·01 | 99·96 |
| 105 | ·01 | Nil | ·02 | ·08 | 99·89 |
| 106 | ·26 | ·04 | ·05 | ·07 | 99·58 |
| 107 | 6·98 | ·03 | ·02 | ·05 | 92·92 |
| 108 | 1·67 | ·22 | ·38 | ·30 | 97·43 |
| 109 | 13·08 | ·94 | ·72 | ·30 | 84·96 |

Nos. 96, 97, 98, and 99 are deficient in all the mineral plant food constituents. No. 100 is poor in lime and phosphoric oxide, and No. 101 in the latter constituent only. A fair reserve of plant food is contained in Nos. 102, 103, 104, and 105. The presence of shells renders the soil from which Nos. 106, 107, 108, and 109 were collected very rich in lime, but potash is deficient in all four of those soils.

The coarser residues of the mechanical analyses were largely made up of shell fragments in the case of Nos. 108 and 109, and entirely so in the case of Nos. 106 and 107.

## HANOVER.

In connection with an irrigation project on the farm Krugers Poort, the soils represented by Nos. 110 to 129 were sampled from the area which it was proposed to place under irrigation. The farm is intersected in an east and west direction by a large dolerite dyke, and it was in a gap in this dyke through which a branch of the Seacow River flows that it was proposed to construct the dam. Four holes were dug to a depth of five feet at different points within this irrigable area, and from each hole five 12-inch samples were collected. Nos. 110, 111, 112, 113, and 114 represent the successive soil levels at one of these points, No. 115 the surface soil, and Nos. 116, 117, 118, and 119 the lower levels at the second hole, and so on. The object of the analyses was to ascertain whether any unsuspected layers of brack exist in the soil, which, under irrigation, might rise to the surface, and in course of time result in such an accumulation of alkali salts as to render the surface soil too brack to yield profitable returns. The following analytical results were obtained, the alkali and other soluble salts being expressed in percentages of the soil as sifted through a 3 mm. sieve.

| No. | Sodium Chloride. | Sodium Sulphate. | Sodium Carbonate. | Total Alkali Salts. | Magnesium Chloride. | Magnesium Sulphate. | Magnesium Carbonate. | Calcium Chloride. | Calcium Sulphate. | Calcium Carbonate. | Total soluble salts by analysis. | Total soluble salts by weighing. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 110 | ·015 | ·011 | Nil | ·026 | Nil | ·018 | ·010 | Nil | Nil | ·055 | ·109 | ·120 |
| 111 | ·011 | ·011 | Nil | ·022 | Nil | ·018 | ·011 | Nil | Nil | ·042 | ·093 | ·112 |
| 112 | ·012 | ·003 | Nil | ·015 | Nil | ·003 | ·014 | Nil | Nil | ·035 | ·067 | ·068 |
| 113 | ·007 | ·007 | Nil | ·014 | Nil | ·008 | ·024 | Nil | Nil | ·024 | ·070 | ·076 |
| 114 | ·007 | ·008 | Nil | ·015 | Nil | ·009 | ·010 | Nil | Nil | ·015 | ·049 | ·046 |
| 115 | ·215 | ·759 | ·193 | 1·267 | Nil | Nil | ·040 | Nil | Nil | ·030 | 1·337 | 1·338 |
| 116 | ·215 | ·682 | ·210 | 1·107 | Nil | Nil | ·113 | Nil | Nil | ·028 | 1·248 | 1·308 |
| 117 | ·129 | ·236 | ·231 | ·596 | Nil | Nil | ·088 | Nil | Nil | ·026 | ·710 | ·724 |
| 118 | ·042 | ·059 | ·214 | ·315 | Nil | Nil | ·020 | Nil | Nil | ·013 | ·348 | ·358 |
| 119 | ·011 | ·038 | ·085 | ·134 | Nil | Nil | ·008 | Nil | Nil | ·010 | ·152 | ·150 |
| 120 | ·016 | ·018 | Nil | ·034 | Nil | ·019 | ·002 | Nil | Nil | ·041 | ·096 | ·098 |
| 121 | ·014 | ·028 | Nil | ·042 | Nil | ·041 | Nil | Nil | Nil | ·036 | ·119 | ·126 |
| 122 | ·012 | ·025 | Nil | ·037 | Nil | ·010 | ·013 | Nil | Nil | ·020 | ·080 | ·084 |
| 123 | ·016 | ·014 | Nil | ·030 | Nil | ·015 | ·012 | Nil | Nil | ·050 | ·107 | ·116 |
| 124 | ·021 | ·013 | Nil | ·034 | Nil | ·018 | ·014 | Nil | Nil | ·043 | ·109 | ·120 |
| 125 | ·010 | ·015 | Nil | ·025 | Nil | ·020 | ·006 | Nil | Nil | ·051 | ·122 | ·128 |
| 126 | ·012 | ·010 | Nil | ·022 | Nil | ·017 | ·007 | Nil | Nil | ·049 | ·095 | ·094 |
| 127 | ·011 | ·015 | Nil | ·026 | Nil | ·027 | ·004 | Nil | Nil | ·050 | ·117 | ·124 |
| 128 | ·011 | ·014 | Nil | ·025 | Nil | ·022 | Nil | Nil | Nil | ·043 | ·092 | ·090 |
| 129 | ·013 | ·005 | Nil | ·018 | Nil | ·013 | ·004 | Nil | Nil | ·041 | ·076 | ·082 |

With regard to the presence of brack salts, there seems to be no ground for alarm in respect of the localities represented by the surface soils Nos. 110, 120, and 125, the total soluble salts in the first five feet of soil at those points being considerably below danger limit, sodium carbonate (black brack), moreover, being absent. At the spot indicated by No. 115, on the other hand, a very different condition of things exists; there the alkali salts are present to such an extent as to impede plant growth, and a large quantity of these salts has been concentrated in the surface layer of soil. This portion of the area is distinctly brack, although it is possible that it may be improved, provided efficient under-drainage is capable of being carried out. Hilgard considered that, even for barley, which is more resistant to alkali than wheat, the total alkali salts in the surface four feet of soil should not exceed .2 per cent. At the locality in question this limit is exceeded more than sixteen times over, and for lucerne cultivation it is certainly excessive in its present condition.

### HERBERT.

Nos. 130 to 132 were taken from different holes made to a depth of eight inches on certain lands proposed to be placed under irrigation by means of a pumping station from the Vaal River. Nos. 133 to 138 were taken from two points on the same farm, from a place where what were regarded as white incrustations appeared on the surface of the soil. Nos. 133, 134, and 135 represented respectively the surface, second, and third twelve inches at a point three-quarters of a mile from the river. Nos. 136, 137, and 138 were taken at a distance of 500 yards from the river, also from the three successive twelve-inch layers in depth. Nos. 139 and 140, from the farm Smithfield, Ward No. 2, were respectively a soil and a sub-soil, both reddish brown and clayey.

These soils were taken from a level stretch of country where the depth of soil averages seven to eight feet, and on which the indigenous vegetation is Karroo bush and ganna. Within two miles of the spot whence the samples were taken is a saltpan. The land had been irrigated from dams and had received one application of kraal manure during the last five years; with good irrigation mealies and oats had been successful, but the soil lost its moisture rapidly, resulting in a wilting of the crops.

Three samples of soil, Nos. 141, 142, and 143, were collected on the farm Mazelsfontein, in the Douglas District, from a tract of twenty-two acres which had been sown with lucerne. The beds had been well laid out and had a fall of five inches in 250 yards; nevertheless the crop failed to make progress. The upper surface of the soil was apt to dry out very rapidly under the action of the burning sun and the drying winds. No. 141 represents a reddish-brown soil, containing a considerable proportion of clay. No. 142 was a similar soil, but with apparently rather less clay. No. 143 was less clayey than either of the other two, and of a less pronounced red colour.

Partial mechanical analyses gave the results shown in the following table:—

| No. | Pebbles, >3 mm. | Gravel and Coarse Sand, 3—·5 mm. | Fine Earth, < ·5 mm. | Nature of Pebbles and Gravel. |
|---|---|---|---|---|
| 139 | ·06 | 1·32 | 98·62 | — |
| 140 | ·18 | 1·50 | 98·32 | — |
| 141 | ·10 | 1·02 | 98·88 | Clay. slate. |
| 142 | ·10 | 1·00 | 98·90 | Slate, chert, lime tufa, and quartz. |
| 143 | ·74 | 1·39 | 97·87 | |

The usual determinations associated with the reserve of plant food in the soils resulted as follows:—

| No. | Percentage of Field Sample. | Percentage of Soil sifted through 1 mm. Sieve. | | | | Percentage of Soil sifted through ½ mm. Sieve. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fine Earth below ½ mm. | Water. | Organic Matter. | Chlorine. | Nitrogen. | Lime. | Magnesia. | Potash. | Phosphoric Oxide. |
| 139 | 98·6 | 4·24 | 4·41 | ·006 | ·074 | ·473 | ·481 | ·093 | ·056 |
| 140 | 98·3 | 4·40 | 3·94 | ·008 | ·049 | ·269 | ·491 | ·056 | ·038 |
| 141 | 98·9 | 4·48 | 3·99 | ·0067 | ·077 | ·676 | ·444 | ·084 | ·089 |
| 142 | 98·9 | 4·11 | 3·73 | ·0019 | ·063 | ·650 | ·141 | ·078 | ·075 |
| 143 | 97·9 | 3·68 | 3·54 | ·0014 | ·049 | 1·358 | ·330 | ·073 | ·059 |

Partial analyses, with a view to gain some information as to the amount of alkali (brak) salts in the above fourteen soils were made.

They resulted as follows, the figures, as in all other cases, indicating percentages:—

| No. | Sodium Chloride. | Sodium Sulphate. | Total Soluble Salts (by weighing). |
|---|---|---|---|
| 130 | ·026 | ·007 | — |
| 131 | ·254 | ·138 | ·508 |
| 132 | ·028 | ·014 | ·084 |
| 133 | ·001 | — | ·034 |
| 134 | ·015 | — | ·044 |
| 135 | ·011 | — | ·054 |
| 136 | ·001 | — | ·066 |
| 137 | ·005 | — | ·038 |
| 138 | ·010 | — | ·038 |
| 139 | — | — | ·030 |
| 140 | — | — | ·040 |
| 141 | — | — | ·040 |
| 142 | — | — | ·036 |
| 143 | — | — | ·042 |

With respect to the soluble salts in Nos. 130 and 132, the above results, as far as they go, may be considered favourable towards the suitability of the soil for irrigation, always remembering that it is obviously impossible in any case to pronounce a definite opinion on supposed brack soils with nothing more than the analyses of mere surface soils as a guide. Such a method, as I have frequently pointed out, often gives most misleading results, and, in order to obtain an idea of the content of alkali salts in any particular soil, holes at least four feet in depth should be dug at intervals on the tract of country where irrigation is projected, and from each hole a series of samples should be taken representing the successive twelve-inch levels. That there is a possibility of undue accumulations of brack at the lower levels of Nos. 130 and 132 is shown by the fact that at the surface of No. 131 there is such an altogether excessive amount.

Of the two Smithfield soils, Nos. 139 and 140, the sub-soil had in all respects less plant food than the surface soil, magnesia alone excepted. In both cases there was a sufficiency of lime, and, though the surface soil had moderate amounts of potash, phosphoric oxide, and nitrogen, the sub-soil was poor in these respects; but with a fair amount of moisture and of organic matter, together with considerable quantities of lime and magnesia, these soils should do well with adequate irrigation and manuring. It was advised that, in order to facilitate the retention of moisture by the soil, deep ploughing and constant cultivation should be practised, and as a dressing from five to seven tons of kraal manure or stable manure was recommended. As far as the examination went, there was no indication of danger from brack in either of these two soils, although it will be gathered from what has been said above that, ere definite opinions can be given, more exhaustive examination is needed. There was, however, no reason to believe that the low standard of productivity yielded by these soils was owing to such a cause, and not rather to their insufficient reserve of plant food and their incapability of retaining an adequate supply of moisture, as already pointed out.

As for the three Mazelsfontein soils, Nos. 141, 142, and 143, in all cases the proportions of lime and magnesia are high. With regard to the other plant food constituents, the three soils are not altogether poor, though the proportions of nitrogen, potash, and phosphoric oxide could with advantage be increased. No. 143 is the poorest of the three in this respect. The greater need for phosphoric oxide than for lime in these soils suggests the addition of superphosphate rather than basic slag; the greater solubility of the former fertilizer and its consequently more easy leaching out of soils, would in this case be met by the fact that the soils are sufficiently clayey to withstand excessive leaching. In such soils the use of a moderate proportion of guano and potash salts might be recommended. It seems that the failure of the crops is due—presuming the conditions of irrigation and drainage to be satisfactory—to lack of phosphoric oxide, nitrogen, and potash in the order mentioned, placing the most important first. It is at the same time possible that complete mechanical analysis may have shown a physical condition of the soil similar to that referred to in connection with the samples from the Britstown Division discussed on an earlier page. The proportions of injurious salts—that is to say, chlorine and soluble salts generally—in the Mazelsfontein soils are very low, at all events in the surface soils, and quite insufficient to produce any harmful effects.

*(To be continued.)*

# How Ticks are Killed when Cattle are Dipped.

By H. E. LAWS, B.Sc., F.I.C.

KNOWLEDGE of the manner in which the poison in a dip is absorbed by ticks when cattle are dipped would be of great assistance in the elucidation of the problem of tick destruction. Although this subject has given rise to much conjecture, very little definite information is obtainable as a result of practical experiment. Work directed by William Cooper & Nephews in South Africa has, however, furnished results from which feasible deductions have been made which appear to throw some light on the subject.

The theories advanced by different workers are—

(1) that the tick absorbs the poison through its skin whilst the animal is passing through the dipping bath;

(2) that the absorption of the poison through the skin of the tick takes place after dipping;

(3) that the beast absorbs the poison into its skin, the tick sucking in the poison with the juices extracted during the process of feeding.

With regard to theory No. 1, those who favour this view assert that in order to achieve the maximum tick killing effect the swim through the bath should be made as long as possible. As a matter of fact it has been established by William Cooper & Nephews that a dip when used in a bath with a short swim is equally effective as it is when used in a bath with a long swim. This points to the fact that the poison is not absorbed by the ticks whilst the beast is passing through the bath. These conclusions were arrived at after dipping a number of cattle in a dipping mixture of exactly the same strength contained in a short tank, in a tank with a long swim, and also by holding cattle in the tank for some time, some of them for more than a minute. It was found that the tick killing was the same in all three cases.

Further, ticks taken off cattle after they had been dipped in an arsenical dip after being cleaned thoroughly and analysed for arsenic were found to be free from this poison, whilst others were taken off on the following day and on the five succeeding days were found to contain appreciable quantities of arsenic, which proves that the arsenic is absorbed *after* the dipping.

Other evidence in support of this is derived from the fact that ticks when placed in water and allowed to remain there for any time up to an hour will decrease in weight, sometimes by as much as 5 per cent., showing that absorption does not take place during the first hour of immersion of the tick.

The following are the weights of some of the different species of ticks before and after being immersed in water:—

### BONT TICKS.

#### No. 1.

A fully engorged female bont was cleaned and weighed. It was then immersed in water for varying periods, taken out, and dried on filter paper, and re-weighed after each immersion. The following are the results:—

| | Grams. |
|---|---|
| Weight before immersion ... ... ... ... ... ... | 1.9612 |
| Weight after 5 seconds in water... ... ... ... | 1.9544 |
| Weight after 10 seconds in water... ... ... ... | 1.946 |
| Weight after 1 minute in water... ... ... ... | 1.9426 |
| Weight after 5 minutes in water... ... ... ... | 1.9418 |

#### No. 2.

| | |
|---|---|
| Weight before immersion... ... ... ... ... ... | 1.3304 |
| Weight after 5 seconds in water... ... ... ... | 1.3086 |
| Weight after 10 seconds in water... ... ... ... | 1.3040 |
| Weight after 1 minute in water ... ... ... ... | 1.2976 |
| Weight after 5 minutes in water ... ... ... ... | 1.2962 |
| Weight after 30 minutes in water... ... ... ... | 1.2844 |

Whilst immersed in water for a period of 1 minute, the tick excreted a quantity of white matter.

#### No. 3.

*Immersion of Bont Tick for* 36 *Hours.*

An engorged female bont was weighed after being cleaned. It was then immersed in cold, recently boiled, water and allowed to remain there for 36 hours.

The bottle was closed with a rubber cork and great care was taken that no air-bubbles were left in.

During the time it was immersed the tick seemed to exude a quantity of air, bubbles being noticed rising from it and eventually becoming coalesced into one larger bubble under the cork.

| | Grams. |
|---|---|
| Weight of tick before immersion ... ... ... ... | 1.787 |
| Weight after 36 hours in water ... ... ... ... | 1.878 |
| Increase in weight... ... ... ... ... ... ... ... ... | .091 |

This increase is equivalent to 5 per cent.

It is interesting to note the weights of engorged and unengorged adult female bont ticks.

No. 4.

*Weight of Engorged Female Bont Ticks.*

Three female bonts were taken from a beast. These had just attached themselves and were still without males.

| | Grams. |
|---|---|
| Weight of tube plus three female bonts... ... | 2,230 |
| Weight of tube alone... ... ... ... ... ... ... ... | 2.118 |
| Weight of three female bonts ... ... ... ... ... | .112 |

Therefore average weight is $\frac{.112}{3}$ which is equal to 0.373 grams.

No. 5.

*Weight of Engorged Female Bont Ticks.*

Six engorged female bonts were weighed separately and the averages taken:—

| | Grams. |
|---|---|
| 1 ... ... ... ... ... ... ... ... | 1.7870 |
| 2 ... ... ... ... ... ... ... ... | 1.9612 |
| 3 ... ... ... ... ... ... ... ... | 1.3304 |
| 4 ... ... ... ... ... ... ... ... | 1.7674 |
| 5 ... ... ... ... ... ... ... ... | 1.8016 |
| 6 ... ... ... ... ... ... ... ... | 1.6224 |
| | 10.2700 |

Therefore the average weight is $\frac{10.2700}{6}$ or 1.7115 grams. An adult female bont during period of engorging increases in weight, therefore, by 1.6742 grams.

No. 6.

*Weight of Male Bont Ticks.*

Six males which had recently attached themselves and which were without females were taken off a beast.

| | Grams. |
|---|---|
| Weight of tube plus six males ... ... ... ... ... | 2.330 |
| Weight of tube alone ... ... ... ... ... ... ... ... | 2.118 |
| Weight of six males ... ... ... ... ... ... ... ... | .212 |

Therefore average weight is $\frac{.212}{6}$ or .0353 grams.

### Red Ticks.

An engorged female red tick was cleaned and weighed. It was then immersed in water for varying periods, dried on filter paper, and weighed after each immersion:—

| | Grams. |
|---|---|
| Weight before immersion... ... ... ... ... ... ... ... | .570 |
| Weight after 5 seconds in water... ... ... ... ... ... | .570 |
| Weight after 10 seconds in water ... ... ... ... ... | .570 |
| Weight after 30 seconds in water ... ... ... ... ... | .570 |
| Weight after 1 minute in water... ... ... ... ... ... | .570 |
| Weight after 30 minutes in water ... ... ... ... ... | .570 |

The weight remained unchanged.

No. 2.

| | |
|---|---|
| Weight before immersion ... ... ... ... ... ... ... | .436 |
| Weight after 5 seconds ... ... ... ... ... ... ... ... | .436 |
| Weight after 10 seconds ... ... ... ... ... ... ... ... | .435 |
| Weight after 30 seconds ... ... ... ... ... ... ... ... | .435 |
| Weight after 1 minute ... ... ... ... ... ... ... ... | .435 |
| Weight after 30 minutes ... ... ... ... ... ... ... | .435 |

Decrease in weight, .001 gram.

### Blue Ticks.

An engorged female blue tick was cleaned and weighed. It was then immersed in water for varying periods, dried on filter paper, and weighed after each immersion.

| | Grams. |
|---|---|
| Weight before immersion ... ... ... ... ... ... ... | .307 |
| Weight after 5 seconds in water ... ... ... ... ... | .307 |
| Weight after 10 seconds in water ... ... ... ... ... | .307 |
| Weight after 30 seconds in water ... ... ... ... ... | .307 |
| Weight after 1 minute in water ... ... ... ... ... | .307 |
| Weight after 30 minutes in water ... ... ... ... | .307 |

The weight remained unchanged.

*Immersion of Blue Tick for* 36 *Hours.*

An engorged female blue tick was weighed after being cleaned. It was then immersed in cold water, recently boiled water, and allowed to stand for 36 hours. The bottle was closed with a rubber cork, and no air-bubbles were left in. During the time it was immersed the tick seemed to exude a quantity of air, bubbles being noticed rising from it in exactly the same way as with the female bont tick No. 3.

| | Grams. |
|---|---|
| Weight of tick before immersion ... ... ... ... | .307 |
| Weight after 36 hours in water ... ... ... ... | .3202 |
| Therefore the increase in weight is ... ... | .0132 |

The increase is equivalent to 4.3 per cent.

As a beast takes from 10 to 15 seconds only to swim through a dipping bath of average size, and that decreases in weight continue as a rule during the first hour of immersion of a tick, it follows that no absorption of arsenic by the tick can take place whilst the beast is passing through the bath.

With regard to supposition No. 2, it is highly improbable that the absorption of the poison takes place through the skin of the tick after dipping, for the fluid dries on the skin in less than an hour after dipping, during which period it has been proved that no absorption does take place.

There remains then only theory No. 3, that the beast absorbs the poison into its skin first, then the tick sucks in the poison with the juices extracted during the process of feeding. All experience with dips in the field goes to support this theory.

Of all the dips containing the same amount of poison, those which penetrate to the skin of the animal most readily give the greatest tick-killing effect. This points to the fact that it is necessary, in order to kill ticks, to make the dip penetrate to the skin, the tick-killing effect being proportionate to the powers of penetration. Then, again, those dips which wet all the ticks and the outside portion of the hair, but only penetrate to the skin in patches kill the ticks only on those parts where it had penetrated to the skin. That arsenic is absorbed by the beast, then taken in by the ticks is confirmed by the fact that subcutaneous injections of a solution of arsenic causes the ticks around the place where the injection was made to die, and although they never came in contact with arsenic externally their remains contained appreciable quantities of this substance. This action of arsenic is local, only those ticks within the radius of about six inches from the place where the injection was made being affected, which proves that the poison does not get into the blood stream but is absorbed by the lymphatic parts and then taken in by the ticks with the juices from the skin.

Another experiment which illustrates that the effect of a dip is local is to spray a beast on the forepart and also on the hind part, leaving a margin of about six to nine inches encircling the whole of the body of the beast unsprayed. The ticks on the sprayed portion and also on the edges of the unsprayed margin die, but those in the middle remain quite healthy. It appears, therefore, that the death of ticks on cattle which are dipped in arsenical dips is due to the absorption of arsenic into the skin of the animal, whence the ticks suck it up with the juices extracted from the skin.

The fact that ticks are killed by the absorption of the poison from the lymphatic portions of the animal shows how necessary it is to use a cattle dip which penetrates thoroughly and uniformly down to the skin of the animal. This can only be done by using the dip containing an oil emulsion.

Watkins-Pitchford* and Brunnich† found in their experiments that this was necessary. With the dip which did not contain emulsion, the killing of ticks was not uniform over every part of the animal's body, whilst in other parts it penetrated the skin to such an extent that it caused cracking, and in some cases the skin was removed in large patches. Watkins-Pitchford* killed some of his cattle by frequent sprayings with arsenite of soda, but with the addition of emulsion he found that the dip penetrated uniformly, the animal being wetted over the whole of the surface of the skin. The action of

* "Dipping and Tick-Destroying Agents," part 1, by Lieut.-Col. H. Watkins-Pitchford, F.R.C.V.S., F.R.S.E.

† "Notes on Dipping Fluids: Composition and Change during Use." Read before Australasian Association for the Advancement of Science by J. C. Brunnich, F.I.C.

the dip was then much less severe, and at the same time was sufficient to kill all ticks.

In the above cases only those dips containing a soluble poison have been considered. Other destroyers of ticks, such as paraffin, are external in their action.

# Turkish Tobacco in the Cape Province.

By L. M. STELLA, Officer in Charge, Turkish Tobacco Experiments, Stellenbosch, of the Tobacco and Cotton Division, Pretoria.

## HISTORY.

IN 1903 the writer purchased a small farm in the French Hoek Valley. The farm was all in bush in the beginning, but when a small area had been cleared during the second year and put under cultivation we decided to give Turkish tobacco a trial. Being unacquainted with the climatic conditions we followed minutely the Turkish methods so far as the curing was concerned, but the first crop, though very small, was a complete failure. Nevertheless, this did not discourage us, and we pursued our experiments more vigorously. In 1905 we began studying the climatic conditions, and after that our experiments were a complete success.

The area under cultivation was 1½ acres, and the yield was 1000 lb. We were unacquainted with the South African market, so when we were offered 1s. per lb. for the crop we accepted it. The price seemed ridiculously low, for the actual cost of producing the crop was 11d. per lb., as we had to deal with raw and inexperienced labour and had many other drawbacks. We were told that the highest price ever paid for the best South African tobacco was 10d. per lb., and that we should be highly satisfied with the offer. After closing the transaction on inquiring elsewhere we were offered 2s. 6d. per lb. for the crop. This manufacturer was in earnest, for he wanted to enter into a contract with us to deliver to him 60,000 lb. of a similar article the next season at 2s. 6d. per lb. This encouraged us to undertake Turkish tobacco growing again. The manufacturer in question was Mr. Hermann, of the firm of Hermann & Canard, Capetown. Great credit is due him for the prompt action he took in helping to make the industry an accomplished fact.

After seeing samples of this tobacco he introduced me to the officials in the Agricultural Department, and explained that he foresaw a great industry ahead of us. He insisted that the Government should lose no time to foster same. The result of the interview was that the Government secured the writer's services, and since then Turkish tobacco has become the staple crop on more than eighty farms, all of which have been successful in the production of this type of tobacco.

### COST OF PRODUCTION AND YIELD PER ACRE.

The approximate cost of production per acre is £15.

An acre of land will yield about 600 lb. of tobacco when the season is good, and valuing this at 1s. 6d. per lb. the total profit would be £45, thus the net profit per acre would be £30. A few exceptionally good crops have almost doubled this figure.

The maximum yield per acre of Turkish tobacco has been about 1000 lb., and the minimum yield 300 lb.

### SEED.

Owing to the want of a Turkish tobacco experiment station in the Cape Province no steps so far have been taken to breed and select our own tobacco seed, consequently we have been compelled to import fresh seed from Turkey each year.

### PREPARATION AND TREATMENT OF SEED BEDS.

The preparation and treatment of the Turkish tobacco seed beds are more or less similar to that applied to the American types. The seed is sown at the rate of 1 ounce per 100 square yards.

### SOILS.

The best soils suitable for Turkish tobacco are those of a reddish friable nature, with about 30 per cent of clay. Grey and yellow sandy loams give good results. Decomposed granite formations also give excellent results, particularly so far as the combustibility of the leaf is concerned.

### MANURING AND TREATMENT OF SOIL.

New lands are preferable, especially when ploughed one year ahead and allowed to remain fallow. Pests cause very little trouble to the crop on such lands. Sheep manure, in our opinion, for Turkish tobacco is the best, provided it is given sufficient time to allow the subsequent rains to dissolve the plant food which it contains. The manure is pulverized and scattered broadcast at the rate of 6 tons per acre and immediately ploughed under. During the interval between the first, second, and third ploughings the land should be harrowed and kept free from weeds. Shortly before setting out the plants the land is reploughed and harrowed. Fertilizers have also given good results, especially where lands had been manured with sheep manure the previous year. When fertilizers are applied in drills it is usually at the rate of 300 lb. superphosphate, 160 lb. sulphate of potash, and 130 lb. nitrate of soda per acre.

Experiments have also been conducted with Karroo ash and Government guano. The usual dressing broadcast per acre is as follows: 1½ tons Karroo ash and 800 lb. Government guano. A lighter application of Karroo ash and Government guano has been tried. It was applied in the drills at the rate of 800 lb. ash and 200 lb. guano. This also gave good results, and the actual cost was 18s. per acre. Such cheap dressings as the last mentioned are not recommended, for the reason that it impoverishes the soil—unless it has been manured the previous year. Karroo ash and guano are applied separately.

No experiments with rotation of crops have been tried in connection with Turkish tobacco, but the farmers have been strongly advised to adopt a rotation system.

### TRANSPLANTING.

The method of transplanting Turkish tobacco plants is similar to that of the American types, the only difference being that the plants are set much closer together in the rows—8 inches to 9 inches apart, and the distance between the rows is 2 feet 6 inches to 3 feet. Instead of making ridges a shallow drill 2 inches deep is cut. This drill serves as an indicator and also retains the water, which is important, as most of our tobacco fields are situated on the slopes of the mountains.

### TREATMENT DURING GROWTH.

When the plants have been established the soil round them is loosened by means of forks, or, where the soil is of a sandy nature, by means of a Planet Junior hand-machine. The horse-hoe is used when the plants attain a height of about 1 foot, and this operation is repeated after each rain until time for priming.

### TOPPING AND SUCKERING.

With Turkish tobacco no topping is necessary. If the flower head is not disturbed very little trouble is caused by suckers, unless heavy rains are experienced; then, in that event, they are removed, as they have a tendency to cause deterioration in the quality of the tobacco.

### PRIMING.

When the flower head is formed the extreme lower leaves show signs of ripeness. Four or five of these leaves are picked, removed from the field, and destroyed, as they are as a rule affected with *Lita solanella,* commonly called "potato tuber moth."

### PICKING THE LEAF.

The leaves are picked early in the morning. The reason for picking at this time is that they are brittle, and therefore it damages the stalk less, and the fine dew on them helps to keep them cool, consequently they wilt and turn yellow better in the wilting-room. The leaves are placed in baskets or boxes and conveyed to the threading-room, where they are graded according to size and threaded on strings fastened to rods, which are usually 7 feet long.

### WILTING.

After the tobacco is threaded it is transmitted to the wilting-room, where it remains about four days so as to change its colour. The room is kept closed during the day and opened during the night. The temperature is kept to about 70° F.

### DRYING.

The tobacco, after it has passed its wilting stage, is transferred during the morning of the fifth day to the curing camp, where the rods are suspended about 2 inches apart on trellises. The first day they are covered with sheets of canvas so that they do not scorch. The

covering is repeated the second day should the weather be extremely hot. The third day the rods are shifted from their position to about 4 inches apart, the fifth day 5 inches apart, and the sixth day 6 inches apart. The idea of shifting the rods daily is to prevent the tobacco from drying too rapidly. The tobacco is covered every night to protect it from dew, and is opened in the morning about an hour after sunrise. It remains on the trellises about ten days, and it is then transferred to the ground on clean sheets of canvas, each rod singly, and allowed to remain thus during the day, but it is covered at night. The next morning the rods are turned, exposing the other surface of the leaves to the sun. This is repeated daily until the midribs of the leaves are perfectly dry. In the morning the tobacco is then removed to the shed and stacked on a platform which has been built about 1 foot from the ground. If the atmosphere is very dry the canvas is removed early in the morning to allow the tobacco to become pliable. The stacks are covered so that the tobacco can retain its moisture and improve in condition. The stacks are carefully watched lest the tobacco may damage with an excess of moisture. If the tobacco is stacked with very little moisture the stacks are broken down once a fortnight and restacked again, but if it is stacked with more moisture than it should possess it should be taken out and dried a bit to reduce the moisture, else it will become mouldy.

The restacking of the tobacco once a fortnight not only improves the colour, but distributes the moisture evenly.

### PREPARATION FOR BALING.

Before baling, in case the tobacco is very dry, the rods are laid down flat and the tobacco sprayed gently on one side with water. A knapsack spray pump, having a Vermorel nozzle, is the most convenient appliance for spraying. The tobacco is then stacked, keeping always the damp part upwards so as to divide the moistured with the unsprayed part. By this means the whole mass becomes soft and elastic. Two days after the tobacco has been sprayed it is restacked. While the tobacco is being restacked if any parcel contains too much moisture it is hung in the sun and partially dried to reduce the moisture. It is advisable to allow the stacked tobacco to remain at least one week before it is baled in order that the moisture may be evenly distributed. It is then graded into three grades, viz., bottoms, middles, and tops.

### BALING.

Baling is undertaken at any convenient time after the conclusion of the drying process. The strings are cut from the supporting rods at each end and folded in such a way as to correspond to the size of the box. The butts are turned outwards and the tips towards the centre. If too much pressure is applied the leaves stick together and cause great inconvenience to the operators at the warehouse. The usual weight of a bale of Turkish tobacco is about 80 lb. The bale is sewn up in canvas with the ends showing the butts of the leaves exposed. At the ends the canvas is laced together criss-cross like a widely laced boot. The bales are then marked and sent to the warehouse where they receive further treatment.

### ACCESSORIES REQUIRED PER ACRE.

A supply of butter muslin for covering seed beds; six threading needles; six baskets or boxes; one knapsack spray pump with a Vermorel nozzle; 500 rods 7 feet long; 500 labels 2 inches long; a supply of hessian for protecting the tobacco from dew.

### PESTS AND REMEDIES.

There are numerous pests which attack the tobacco plant, but the most troublesome ones at present in the Turkish tobacco district are earth-fleas, slugs, cutworms, and budworms. The two former generally attack the plants in the seed beds, and the latter the plants in the field.

From personal observations made at several farms we found that where a crop had been attacked by pests the land had been allowed to remain weedy during the autumn and winter months. On the other hand, if the land had been kept clean or happened to be new, very little trouble was experienced.

It is advisable to use new soils for seed beds, located away from any gardens, but if this is impracticable the best way to treat the old seed beds would be to keep the surface of the beds, as well as the surroundings, clean during the summer and autumn months.

*Earth-fleas.*—To combat this insect clean cultivation is absolutely essential. Seed beds are sometimes completely destroyed by earth-fleas. This generally happens in old, damp, sandy gardens during rainy seasons, and frequently when the seed beds have been covered with muslin. The seed beds may remain covered as long as fine weather prevails, as the plants will grow faster, but they should be opened during the day after every rain, exposing the plants to the sun so as to reduce the moisture. Tobacco extract, using one part fluid to sixty of water, is useful to combat this insect. Application can be made by means of either a knapsack spray pump or a bucket pump fitted with a Bordeaux nozzle. It is advisable to spray again after eight days, thus obtaining the most effective results.

*Insects.*—In addition to earth-fleas there are numerous other insects which cause great destruction to the young tobacco plants in the seed beds. For such insects 1 lb. arsenate of lead to 12 gallons of water is an effective poison. This solution can also be applied with either a knapsack or bucket spray pump, but preferably with a Vermorel nozzle. The treatment is repeated again after eight days. It is advisable to thoroughly spray the seed beds with the same solution a day or two before transplanting as a preventive against pests attacking the young plants in the field.

The above-mentioned solution has been applied at several farms where experiments with Turkish tobacco were conducted, and not only proved successful, but was instrumental in saving many a seed bed and field from destruction.

*Cutworms.*—For cutworms we used poisoned bait in the form of green vegetation moistened with sweetened water containing arsenical poison at the rate of 1 lb. of arsenite of soda, 8 lb. of treacle or brown sugar, and ten gallons of water. These are dissolved in a tub and filled with green vegetation such as lucerne, green barley, oats, or cabbage leaves, which are allowed to soak well, and then the mixture is applied after sunset broadcast on the land a week or two before setting out the plants. This should be repeated after four days. The

idea of applying the bait in the evening is to keep it fresh, as the cutworms crawl about at night in search of food and readily eat the bait.

We find that it is of no use applying bait on weedy lands unless such lands are ploughed a few days before and any vegetation left on the surface destroyed by harrowing.

*Budworms.*—These worms generally attack the leaves of the plants in the field, and if left undisturbed are capable of destroying entire crops. As a remedy the plants are sprayed with a solution of arsenate of lead in the same proportions as recommended for the seed beds, but only before the plants attain a height of about one foot. The arsenate of lead sticks to the leaf and thus damages it. After this stage the worms are picked by hand. If the moth, which generally appears in the field from the middle of November until the end of December, could be caught early in the morning and destroyed, very little trouble would be experienced with budworms. Fortunately these worms are very fond of the tobacco seed, and as the Turkish tobacco flower head is not broken out (as is customary with other varieties of tobacco) the budworm feeds and confines itself to the seed. Sometimes the pest makes its appearance before the flower head is formed; in that case it is necessary to either spray or hand-pick to get rid of them.

*Mildew.*—Fortunately in the western parts of the Cape Province we have been able to avoid the mildew by establishing our tobacco plantations on well-drained soils and by allowing free circulation of air between the rows, also by priming the leaves at the proper time. When the bottom leaves are primed off a further free circulation of air is allowed beneath the plant.

*Mosaic Disease.*—This disease appears on the leaf in dark green spots, and sometimes the whole of the plant is affected. Such a leaf is practically worthless after it is cured. The dark green spots never change colour and never contract moisture, and are brittle to the touch. So far no remedy has yet been discovered, but it is surmised that the disease is caused either through an excess or deficiency of minerals or moisture in the soil, or through injury to the roots when transplanted. Fortunately this disease has caused very little trouble, and whenever a diseased plant is found it is pulled up and removed from the field.

# The Effect of Poisons upon the Elegant Grasshopper (*Zonocerus elegans*).

By W. Moore, B.A., Lecturer in Entomology and Zoology, School of Agriculture, Potchefstroom.

During the last few years the Elegant Grasshopper, also known as the King Grasshopper, has attracted considerable attention. This grasshopper is primarily a garden pest, feeding upon potatoes, tomatoes, onions, peas, beans, lettuce, etc., but it is also an orchard pest, eating the foliage and often the fruit of apples, plums, peaches, grapes, etc. No very satisfactory treatment of this insect is known. Lounsbury and Thomsen * have studied the effect of a bacterial disease (*Coccobacillus acridiorum*, d'Herelle) upon the elegant grasshopper, but the disease failed to clear the field of the pest.

When young the grasshoppers cluster together in the evening, and can then be readily collected with an insect net, but most farmers will permit the grasshoppers to develop beyond this stage before they think about taking active measures to destroy them. Arsenite of soda mixed with treacle and bran can be used with some degree of success as a poison bait, but some of the grasshoppers will still continue to feed upon the plants in the garden and will thus survive the treatment. Arsenite of soda and treacle can be sprayed upon the plants and will prove successful in destroying the grasshoppers, but will also kill the plants sprayed. Many gardeners and farmers object to this treatment, as they do not wish to destroy their plants.

## Experiments with Poisons.

Last summer a number of experiments were carried out with the object of finding a poison which would kill the grasshopper and not kill the plants. The first experiments were performed to discover what poisons would kill the grasshoppers regardless of the effect of such poisons on the plants. In these experiments the poison was mixed with bran and treacle, a handful of bran being used and sufficient treacle to moisten it. As some of the grasshoppers collected in the field had just fed, while others had not, the grasshoppers were collected and kept without food in order that they would be sure to eat the poison when placed in the jar containing the poisoned mixture.

* *Union Agricultural Journal*, Vol. V, No. 4, p. 607.

The following table shows the results of these experiments:—

| Poison Used. | No. used in Experiment. | Number Died. | | | | | | | | | | | | Total Dead. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1st day. | 2nd day. | 3rd day. | 4th day. | 5th day. | 6th day. | 7th day. | 8th day. | 9th day. | 10th day. | 11th day. | 12th day. | |
| Lead arsenate ... | 7 | — | — | — | — | — | — | — | — | — | — | — | — | none |
| Sodium arsenite ... | 7 | 5 | 2 | — | — | — | — | — | — | — | — | — | — | 7 |
| Potassium cyanide ... | 7 | — | — | — | — | — | — | — | — | — | — | — | — | none |
| Paris green ... ... | 7 | — | 2 | 5 | — | — | — | — | — | — | — | — | — | 7 |
| Copper sulphate ... | 10 | 1 | 1 | 1 | 1 | 1 | 1 | — | — | — | — | 1 | 1 | 8 |
| Bordeaux mixture ... | 10 | — | — | — | — | — | — | 2 | — | — | — | 2 | 1 | 5 |
| Phosphorus paste ... | 10 | — | — | — | — | 1 | 2 | — | — | 2 | — | — | 1 | 6 |
| Mercuric bichloride ... | 9 | — | — | — | — | — | — | — | — | 1 | 1 | 3 | 1 | 6 |

Lead arsenate is insoluble in water, and the digestive juices of the grasshoppers seemed not to be able to digest or render it soluble. The result was that the lead arsenate was passed through the body and was present in the excrement, while the grasshoppers were not killed. Sodium arsenite on the other hand is quite soluble in water, with the result that it was absorbed by the grasshoppers, which died within one day from the time they ate the poisoned mixture. Potassium cyanide, however, is also soluble in water, and one would expect the grasshoppers to be killed by this poison. It was, however, found that the cyanide was decomposed when mixed with treacle and bran, forming potassium formate and ammonia. When the grasshoppers ate the mixture the poison was no longer present. Paris green, which is mostly the arsenite of copper and slightly soluble, killed the grasshoppers within three days. The copper sulphate, although soluble, was probably formed into a slightly insoluble compound with the treacle, with the result that it only acted upon the grasshoppers slowly. Bordeaux mixture, which is made with lime and copper sulphate, and is the hydroxide of copper, only slightly soluble, killed the grasshoppers only after a number of days. Phosphorus paste, made of yellow phosphorus, is considered a very violent poison, but only killed the grasshoppers after a number of days. Bichloride of mercury, known as corrosive sublimate, although soluble in water, did not kill quickly as might have been expected. The reason for this was found to be due to the fact that the digestive juices of the grasshopper rendered a large portion of the bichloride insoluble, and only when fed in excess did it kill them.

From these experiments it would seem as though arsenic, if in a compound which was soluble or partly soluble, would kill the elegant grasshopper, but if in the form of an insoluble compound, would not destroy them. A number of arsenites and arsenates were tried in the next series of experiments.

In the following table the compounds of arsenic used are all rather insoluble, and are arranged according to their solubility in distilled water, the most soluble being first. An exception is the arsenious sulphide, which is slightly soluble in water, insoluble in acid, but readily soluble in alkali.

| Poison Used. | Number of Insects Used. | Number Died. | | | | | | | | | | Total dead. | Average number of days from feeding to death. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1st day. | 2nd day. | 3rd day. | 4th day. | 5th day. | 6th day. | 7th day. | 8th day. | 9th day. | 10th day. | | |
| Arsenite of lime ... | 7 | 4 | 1 | 1 | 1 | — | — | — | — | — | — | 7 | 1·6 |
| Arsenate of lime ... | 7 | 1 | 3 | 0 | 1 | 1 | 1 | — | — | — | — | 7 | 3·13 |
| Arsenite of lead ... | 7 | 1 | 2 | 2 | 2 | — | — | — | — | — | — | 7 | 2·6 |
| Arsenite of copper ... | 7 | 0 | 0 | 2 | 3 | 2 | — | — | — | — | — | 7 | 4 |
| Arsenate of copper ... | 7 | 0 | 2 | 0 | 2 | 1 | 2 | — | — | — | — | 7 | 4·5 |
| Arsenate of lead ... | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | — | — |
| Arsenious sulphide ... | 7 | 7 | — | — | — | — | — | — | — | — | — | 7 | 1 |

From this table it is seen that there is a direct relationship between the solubility of the arsenite or arsenate and its killing power. The exception to this rule is that of the arsenite of lead, which, although less soluble than the arsenate of lime, will kill sooner. This is probably due to the arsenites being more poisonous than the arsenates. The same is true of the arsenite and arsenate of soda used in cattle dips, it being considered that the arsenate is only about 50 per cent. as poisonous as the arsenite.*

The arsenious sulphide is rendered quite soluble by the alkaline digestive juices, and is therefore as good as the arsenite of soda, which is quite soluble.

Lead arsenate, although insoluble in water, and also in the digestive juices of the grasshopper if fed upon fruit, will kill them in a few days. The reason for this is that the fruit acids dissolve the lead arsenate, thus making it poisonous, but only to a slight extent. This probably explains why the grasshoppers do not feed to any extent upon vegetation sprayed with lead arsenate, since a certain amount of the poison is probably rendered soluble by the plant juices, not sufficient to kill the grasshopper, but sufficient to make them sick and cause them to leave such vegetation.

*Results.*—From these facts it will be seen that, for spraying purposes, what is needed is as soluble a compound of arsenic as can be applied to the plants without injury to the foliage. Arsenite of soda cannot be used, as it will injure the foliage. The next best compound is the arsenious sulphide, but the sunlight decomposes it into arsenious oxide, which burns the foliage. Arsenite of lime and paris green are both of value in destroying the grasshopper. Paris green is apt to burn the foliage if not used with lime. The formula for use therefore is:—

| | |
|---|---|
| Paris green ... ... ... ... ... ... | 1 lb. |
| Quicklime ... ... ... ... ... ... | 1 lb. |
| Water ... ... ... ... ... ... ... ... | 150 to 160 gallons. |

The paris green, in some cases, could well be used as a dust spray. As a dust spray the paris green is mixed at the rate of one part of paris green to ten to twenty parts of flour, lime, or ground gypsum. Paris green as a dust spray has been used successfully against the elegant grasshopper in a tobacco field.

The arsenite of lime is also a successful spray for the elegant grasshopper, providing it has been well made. If not carefully

* Cooper & Laws, *Union Agricultural Journal*, Vol. V, No. 5, p. 716.

made, it is, however, apt to injure the foliage of the plant. The best method for making is to use 1 lb. of white arsenic and 1 lb. of washing soda to 1 gallon of water. The arsenic and soda are boiled for about fifteen to twenty minutes in an iron vessel. While hot this solution is used to slake 2 lb. of quicklime, after which sufficient water is added to make 2 gallons. Two quarts of this stock solution is used to 45 gallons of water in making up the spray. The best results can be obtained with these sprays, if sufficient dark sugar or treacle is added to sweeten them.

# Vegetable Fibre in Wool.

## THE COMMISSION'S REPORT FOR 1912.

THROUGH the courtesy of the Vegetable Fibre Commission we are enabled to publish herewith the Report of the Commission for 1912. We commend the report to the careful perusal of wool-growers throughout the Union.

The illustration below, showing a piece of cloth containing vegetable fibre, is from a block kindly lent by the commission.

The report is as follows:—

The committee have pleasure in reporting some progress in their efforts this year to provide a cheaper pack than those previously recommended.

An exhibition of new wool packs was held in London at Messrs. Browne & Eagle's warehouse during the July sales. All important makers were invited to send exhibits. Unfortunately, most of these new packs, although showing great merit and considerable improvement, did not come within the range of the committee's requirements owing to their high prices. It has been strongly urged on the committee by growers that the increased cost of the previously recommended packs was prohibitive unless the buyer would share. Consequently, recent efforts have necessarily been confined almost entirely to the search for better value. The demand from all quarters for guidance and for definite recommendation has also been so strong that the committee have been compelled, with much reluctance on their part, tentatively to recommend some packs which will come in at, or near, the basis of the present Calcutta wool pack.

The committee desire definitely to emphasize the fact that they still hold to their previous recommendation of the paper-lined pack on the lines of the "Prolana," produced by Messrs. W. Ritchie & Son, London, and believe that growers of the choicest wools will gladly use this class of pack, which is now obtainable at about 9d. above the price of the old Calcutta jute bag.

*Plate No. VI.* PIECE OF CLOTH CONTAINING VEGETABLE MATTER.

This fibre being in minute strands and of the same colour as wool cannot always be detected in sorting. When, therefore, it is carried forward into the cloth its presence is revealed for the first time, because being vegetable, it does not take the same dyes as wool. When the defective fibres are picked out of the cloth (burled) a weak place is left in the cloth which it is difficult or impossible to conceal.

Of the new packs which were exhibited, the committee consider that the "Lobonite" paper lined, made by Messrs. Low & Bonar, of Dundee, which will only cost 4d. per pack above the ordinary Calcutta bags, is also worthy of trial. The paper lining is affixed to the bag by pitch, which has made the committee somewhat nervous of giving their full recommendation, but in the tests, which have been carefully and severely made, there appears to be little or no detriment to the wool. The real test, however, will be the shipments from the Colonies to the European factories. Therefore the season's experience will have to decide the ultimate recommendation of this class of wool pack.

The committee are very regretful that several experiments on which they had based high hopes have not yet proved themselves sufficiently satisfactory to be recommended. An anti-fibrous pack, which has been made in Australia, seems to be an effort on the right line, but the opinion is held that the superficial treatment will probably have to be superseded by treatment of the jute in the yarn rather than in the cloth.

Fortunately, the manufacturers of wool packs are assisting the committee very materially in their efforts, and the research which is being made on all sides gives some confidence that this difficult question is within reach of solution.

The committee have been much impressed by the remarkably useful and attractive samples which have been placed before them of paper twine, and hope that some of the more enterprising growers will make a trial of this twine, so that it may be thoroughly tested in the shipments which are made to Europe.

A large quantity of photographs, showing the damage done to fine wool fabrics by jute fibre, have been distributed to the various wool-growing centres, and further supplies can be obtained on application to the president or secretary of the committee.

It is hoped that the pastoralists and various wool associations in the Colonies will co-operate with the International Committee by forming a Colonial Committee to investigate this question and help to solve the problem.

(Signed) H. DAWSON, *Secretary*.

73 Basinghall Street, London, E.C.

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The following is a minority report, signed by Messrs. H. F. de Little and W. Acton Adams:—

We, the undersigned, representing the wool growers on the committee, while agreeing in general with the report drawn up, wish to record our opinion that unless the manufacturers, as represented by the wool buyers, will agree to pay part of the extra cost of an improved pack, no satisfactory solution of the difficulty will be arrived at.

From samples and quotations received from different parts of the world, it is evident that the kind of pack required by the trade will cost about 4s. delivered in the Colonies, and probably more, and we feel confident that the great body of wool growers in Australia and New Zealand will not pay the whole of this price unless they can see some material benefit to be derived from it.

# Botanical Notes.

By JOSEPH BURTT-DAVY, F.L.S., Government Agrostologist and Botanist, and Miss S. M. STENT, Herbarium Assistant.

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*Fodder Plants for the Dry Bushveld.*

MR. CHARLES MAGGS, of Pretoria, who owns a farm on the Springbok Flats, has furnished specimens of two native plants which are commonly met with on the Flats, and which are eaten by stock. He considers these plants to be particularly useful in parts of the Flats where it has so far been found impracticable to grow artificial fodder plants, and considers that it would be worth while to collect seed and cultivate these plants.

The first of these is *Cadaba juncea* (Linn.) B. & H. (see Plate II), a rather woody and almost leafless plant of the family Capparidaceae. Mr. Maggs reports that it grows on both red and black turf soils, and that it is "eagerly sought by stock of all kinds." It, further, has the great merit of being drought-resisting and remaining more or less green throughout the winter months. "Where the land has been cultivated," he adds, "the growth of the plant increases wonderfully."

The second is a kind of wild convolvulus or wild sweet potato (*Ipomoea crassipes* Hook.) of the family Convolvulaceae (see Plate III). It is said to remain grass-green in spite of the most severe drought, and the way that stock nibble it down to the ground during the dry seasons is an eloquent testimony to its feeding value.

Material of these two plants was submitted to the Chief Chemist for analyses, and the following is his report:—

*Cadaba juncea* (Linn.) B. & H.

| | (*a*) Young growth. Per cent. | (*b*) Six months' growth. Per cent. |
|---|---|---|
| Moisture... ... ... ... ... ... | 14.06 | 11.52 |
| Ash ... ... ... ... ... ... ... | 7.93 | 8.40 |
| Protein ... ... ... ... ... ... | 13.75 | 12.40 |
| Carbohydrates ... ... ... | 36.40 | 31.60 |
| Fat ... ... ... ... ... ... ... | 1.15 | 1.76 |
| Fibre... ... ... ... ... ... ... | 26.80 | 34.75 |
| The ash includes:— | | |
| Silica... ... ... ... ... ... | .09 | .07 |
| Lime ... ... ... ... ... ... | 2.54 | 3.25 |
| Magnesia ... ... ... ... | .09 | .17 |
| Phosphoric acid ($PeO_5$) | .30 | .17 |
| Sulphuric acid ($SO_3$) ... | 2.19 | .88 |

Contains a fair amount of protein, i.e. 1½ to 2 times the average for grasses. (*b*) Is rather higher in fibre, but (*a*) is lower than the average for grasses. The ash is high and rich in lime. Rich in

*Plate No. II.* *Cadaba juncea.*

sulphates. Shows a high percentage of valuable ash constituents, whilst the general feeding value is good, except that the six months' old material is rather high in fibre, although not so high as one would have thought from its appearance.

*Ipomoea crassipes* Hook.

| | Per cent. |
|---|---|
| Moisture | 12.23 |
| Ash | 8.77 |
| Protein | 10.90 |
| Carbohydrates | 41.10 |
| Fat | 3.92 |
| Fibre | 23.17 |
| The ash includes:— | |
| Silica | .63 |
| Lime | 2.52 |
| Magnesia | .54 |
| Phosphoric acid | .83 |
| Sulphuric acid | .26 |

It contains a fair amount of protein, i.e. from 1½ to 2 times the average for grasses, and lower than the average of fibre for the grasses. Ash is high and rich in lime. Rich in phosphates. Shows a high percentage of valuable ash constituents, whilst the general feeding value is good.

NEW ZEALAND TALL FESCUE (*Festuca arundinacea* Vill.).

Anxiety has occasionally been expressed by New Zealand farmers who have settled in South Africa as to whether the Tall Fescue, which we have been recommending as a winter pasture grass, might not become as much of a nuisance in this country as in New Zealand. We, therefore, wrote to Dr. Cockayne, the Biologist of the Department of Agriculture, Wellington, New Zealand, for information on the subject, and he replies as follows:—"*Festuca arundinacea* Vill. was originally sown in New Zealand on rich swamps that were liable to occasional flooding. In such a locality this grass grows to an immense height and produces a coarse, harsh herbage, which stock do not thrive on. *Festuca arundinacea* in such localities is nothing more than a weed, and the great expense of getting rid of it has given this grass an extremely bad name. When sown on dry hill-sides it is certainly valuable, and its use is being adopted also in the pumice (volcanic grass soils) district of the North Island. Nearly all the seed collected in New Zealand is exported, and the amount used here is really very small. The rainfall in our arid districts is fairly distributed over all the months, except November, December, and January."

Under these circumstances there seems to be no reason for anxiety in the matter. We have grown New Zealand Tall Fescue at the Botanical Experiment Station for the last nine years, and it has never shown any sign of becoming a weed.

Analysis of fescue grass carried out in the Pretoria laboratory by the Chief Chemist:—

| | Per cent. |
|---|---|
| Moisture, originally present | 60.69 |

The air-dry hay contains:—

| | |
|---|---|
| Moisture | 9.14 |
| Crude albuminoids | 13.65 |
| Crude fibre | 18.36 |
| Soluble carbohydrates | 38.70 |
| Ether extract (fats + oils) | 10.72 |
| Ash | 9.43 |
| | 100.00 |

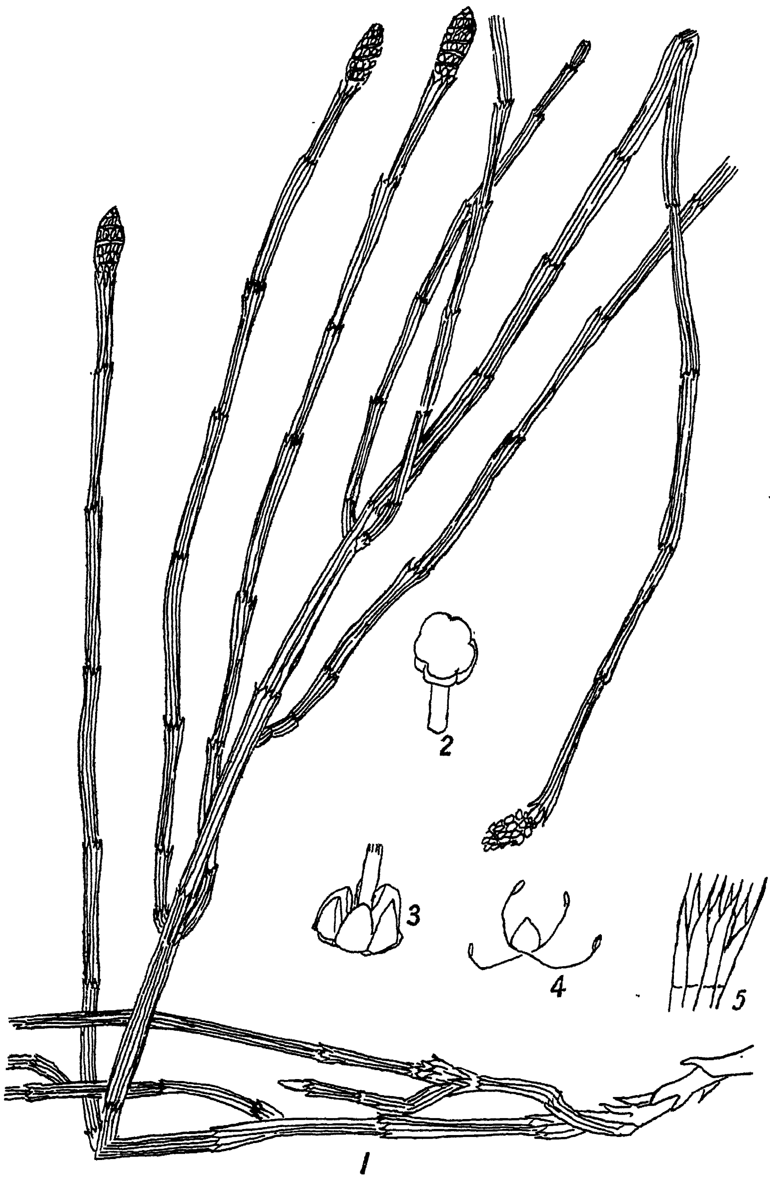
NEW ZEALAND TALL FESCUE (*Festuca arundinacea*).

## PEANUTS OR MONKEY-NUTS (*Arachis hypogaea*).

Inquiries have been received from time to time about machinery for harvesting peanuts. We are informed that such a machine is

*Plate No. III.* *Ipomoea crassipes.*

turned out by the International Harvester Company of America, Memphis, Tennessee, United States of America, who have an agent in London. We expect that there are other and equally good machines on the market.




HORSE TAIL OR DRONK-GRASS (*Equsetum ramosissimum*, Desf.).
2 and 3. Receptacles (magnified). 4. Spore and Elaters (magnified). 5. Sheath (magnified).

### *Spineless Cactus.*

A correspondent living near Windsorton, Cape Province, writes that he proposes to plant spineless cactus along the inside of the fences

of his irrigated lands: "I am now feeding my dairy cows on the ordinary prickly pear, which gives a lot of extra work in removing the spines. I am cutting up pear with lucerne."

### *Agave americana* Linn.

With further reference to our note published in a previous issue in the *Journal* asking for specimens of *Agave americana* producing bulbils, information on the subject has been received from three correspondents. A lady in Natal writes that she has seen this plant bearing bulbils in the Botanic Gardens at Maritzburg. The Curator of the Botanic Gardens, in reply to an inquiry, states, however, that the particular plant in question was *Fourcroya gigantea*, the Mauritius hemp; it is not improbable that other reports from Natal refer to the same plant.

Mr. Newberry, the Curator of the Pietermaritzburg Botanic Gardens, writes that "the habit of producing bulbils is quite common with *Fourcroya gigantea*, the leaves of which are, of course, very different from those of *Agave americana* Linn. In another part of the gardens, *Agave rigida* Mill. (Sisal hemp) produced bulbils last year, but I have never noticed this happen on *Agave americana* Linn. in the sandy, open pine woods land."

Mr. R. W. Watson, Ladismith, Cape Province, has sent us specimens of what appears to be the true American aloe, bearing young plants on a false flowering stalk. He writes: "I have never seen bulbils on a terminal flowering shoot, but they are fairly common on those broken when green and on plants rooted up which have sent out flowering stalks. When the flowering stalk has been cut before quite dry, the aloe sends up thin flowering stems (I cannot say if they bear perfect flowers), I think from the side of the old flowering stalk, and it is one of these I am sending."

### RHODES GRASS (*Chloris gayana* Kunth).

A correspondent in the United States writes as follows with reference to some seed sent him by this Department:—

"We are securing most excellent results with Rhodes grass in Florida, and also very promising results with another species of *Chloris*, the identity of which I am uncertain, but which also comes from South Africa. I am anxious to secure small packets of seed of anything that may furnish good pasturage and spread naturally. As you are aware, the natural forage of Florida is very poor in quality, and I am hoping that we will be able to find grasses which will spread naturally in Florida, and thus improve the grazing, which is mostly in the sandy, open pine woods land.

### NATURAL SPREAD OF *Paspalum dilatatum* Poir.

Half a dozen or so plants of *Paspalum dilatatum* were planted at the foot of a dam wall on a farm near Vereeniging, Transvaal, in March, 1910. After a very trying time through the depredations of stock, they have spread into a large patch. The writer visited the spot at the beginning of February, 1913, and found the Paspalum colony in a very flourishing condition; the seed had been carried down the vlei by wind and rain, and young plants were to be found for a distance of 100 feet from the original plants.


*Paspalum dilatatum.*

SHEEP'S BURNET (*Sanguisorba minor*).

TOOWOOMBA CANARY-GRASS (*Phalaris bulbosa*).

1. Flowering plant in October. 2. Branched inflorescence of early Spring.

### *Sanquisorba minor* Scop. ("Sheeps Burnet").

Experiments are being carried out at the Groenkloof Botanical Experiment Station, Pretoria, with this plant on dry, gravelly soil, with an under strata of slate. So far it is succeeding, and is standing well the drought and frost.

### *Phalaris bulbosa* Linn.

In an experiment with this grass at the Botanical Experiment Station, Groenkloof, Pretoria, it has been observed that from one commercial packet of seed plants appeared that differ considerably in habit and in amount of herbage. Some bear a quantity of seed and little leaf; others little or no seed and a great deal of leaf, while the best bear a full leafy bottom and a fair quantity of seed. A process of selection is being carried out with these different strains in order to try and procure only the best of them.

### *Equisetum ramosissimum* Desf. ("Horsetail," "Dronkgras").

This is not a true grass, but belongs to the fern family. It consists of a blackish, creeping rootstock and numerous greyish-green ribbed and many jointed, hollow branches, the seeds or spores being borne in cones at the tips. These fruiting cones, however, are not always present. It is usually found in vleis and in marshy places and along river banks. It is poisonous to stock, especially to horses and mules.

Allied species of Equisetum occur in the United States, and have been subjected to feeding tests, which have proved that the poison is a cumulative one, a mare in one case going for six weeks after eating of Equisetum hay before she showed any symptoms of poisoning. Younger animals, however, succumbed more quickly.

Equisetum appears to be more dangerous in the dry state than when green.

### *Euphorbia tirucalli* Linn.

A tree with round stem and numerous jointed leafless branches, the smaller ones at the tip being about the size of a finger in diameter. The milky juice is acrid and stocky, and contains a certain amount of rubber. Specimens were sent from Pietpotgietersrust under the local name of "Mutlalamela." In India it is known as milk-hedge or milk-bush, tirukalli, etc.

There was some difficulty in identifying this plant exactly, owing to the lack of flowers, so specimens were sent to Kew for comparison with other South African material, and that the description, if new, might be included in the South African Euphorbiaceae at present being worked up there for the *Flora Capensis*.

The Director, Sir David Prain, writes as follows:—"Mr. Brown (the botanist who is specializing on the Euphorbia family) has examined the material, and, as far as he is able to judge in the absence of flowers, thinks that it is probably the same species as that which is being worked in Natal as a source of rubber. This species has been thought to be distinct from *E. tirucalli* Linn. and in the *Flora of Tropical Africa* was described as *E. Media* N.E.Br. But there is now reason to believe that this may be a mistake, and that the plant is really *E. tirucalli*, and that the latter has probably been introduced into India by the Portuguese from Portuguese East Africa."


*Bromus maximus* Desf.


*Plantago lanceolata.*

*Uses.*—*Euphorbia tirucalli* is one of several plants burned in India for the production of pearl ash, the crude form of carbonate of potash, which is the chief source of caustic potash.

It has been found that, after boiling, the latex of this tree becomes brittle, though, whilst warm, it is ductile and elastic. Giberne (*Ind. For.*, 1899, XXV. 84-5) found that nitric acid caused the separation of the rubber. Mixed with mud, the latex is used in North Arcot in the construction of the flat roofs of houses. It is in Ganjium said to be used to intoxicate and poison crows; a little of the latex is mixed with boiled rice and placed where these birds will find it.

The acrid juice is in India generally well known as a purgative and counter-irritant (especially in the treatment of animals), and it is so very painful when applied to wounds or to the eye that cattle are fully aware of this fact and will not attempt to break down a hedge of it.

The bark is used in India to poison fish.

In Chaitra and Vaisakha it is planted as a hedge round the gardens in whi·h *Piper Betle* is grown.

*Anoiganthus breviflorus* Baker, Family Amaryllidaceae.

This plant is sometimes called "Yellow Tulp," though in reality it does not belong to the same family and resembles more the Narcissus in habit. Two or three flowers on short stalks spring from the tip of a rather thick common stalk; the flowers are about an inch long and bright yellow.

This plant has been suspected of poisoning cattle in two different localities in Natal. It was therefore deemed advisable to carry out a feeding test with it, and a quantity of the material was sent to the Veterinary Research Department for that purpose. The result was entirely negative, that is to say, the beasts fed with it showed not the slightest symptoms of poisoning. The Director of Veterinary Research, however, in his report on the results of this test, says: "Considerable difficulty was experienced in obtaining a regular supply of the plant, hence the intervals in the feeding and the comparative smallness of the feeds; these circumstances mitigate somewhat against the value of the test, as larger quantities might induce poisonous symptoms, but the above result is sufficient to show that this plant does not possess the extremely poisonous properties suggested by one correspondent."

# The Culture of the Buchu Plant.

By G. R. von Wielligh.

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Up to the present the culture of buchu has been sadly neglected, especially here in South Africa, where the plant is indigenous. Instead, the reverse policy has been pursued, and these valuable plants have been injudiciously exterminated by the coloured labourers. The mode pursued up to the present has been either to cut down the plants in a most careless way with sickles, or to uproot them, of which methods the latter is much more to be deprecated than the former. Then, again, the best time to harvest the leaves is in January and February, just the time when these plants are in seed, thus the greater part of the seed is lost. The continual veld fires have also had a very detrimental effect, destroying the seedlings and the young plants. The result has been that those farms which once provided lucrative fields of buchu are now devastated in such a way that plants are found only here and there, and do not pay the cost of gathering the leaves. New fields are opened annually, yet the exports have diminished from 243,742 lb. in 1908 to 223,021 in 1912. At the same time the price of the exported leaf has risen about five hundred per cent.

While this was going on no steps were taken by the legislature to prevent the extermination of buchu; only lately have feeble steps been taken here and there by local corporations to suppress this procedure, but these efforts are as yet far too inefficient to prevent the inevitable extermination of the plant.

Then again, unscrupulous persons for private gains have not hesitated to adulterate the genuine buchu leaves by adding worthless leaves of other shrubs differing very little in form and appearance, thereby rendering a valuable article worthless. When this fraud was detected the demand declined, and the market prices suffered greatly, especially in America.

As stated, the cultivation of buchu has remained in abeyance; here and there a few persons have taken up the growing of buchu, but merely as a curiosity and not as a commodity of commerce.

In April, 1875, I dug out some plants of the mountain buchu (*Barosma betulina*) and planted them in a garden on the farm Bon Esperance, near Porterville Road Station. I was successful in getting all of them to grow. This encouraged me to pay more attention to the cultivation of these plants; I reasoned that if they were allied to the Rue family they must also grow from cuttings. I then took cuttings with old and new wood and planted some in vegetable mould, some in sandy loam, and others in pure sand. Being inexperienced in the matter, I did not proceed in the proper way; however, I managed to root two cuttings in pure sand. We then left the farm, and nothing more was done to these cultivated buchu plants.

Lower down on the Klein Berg River I repeated my experiments in growing from cuttings, but only succeeded with those plants in pure sand, and only with cuttings which had old wood of the previous season's growth and that had been taken at a time when growth in

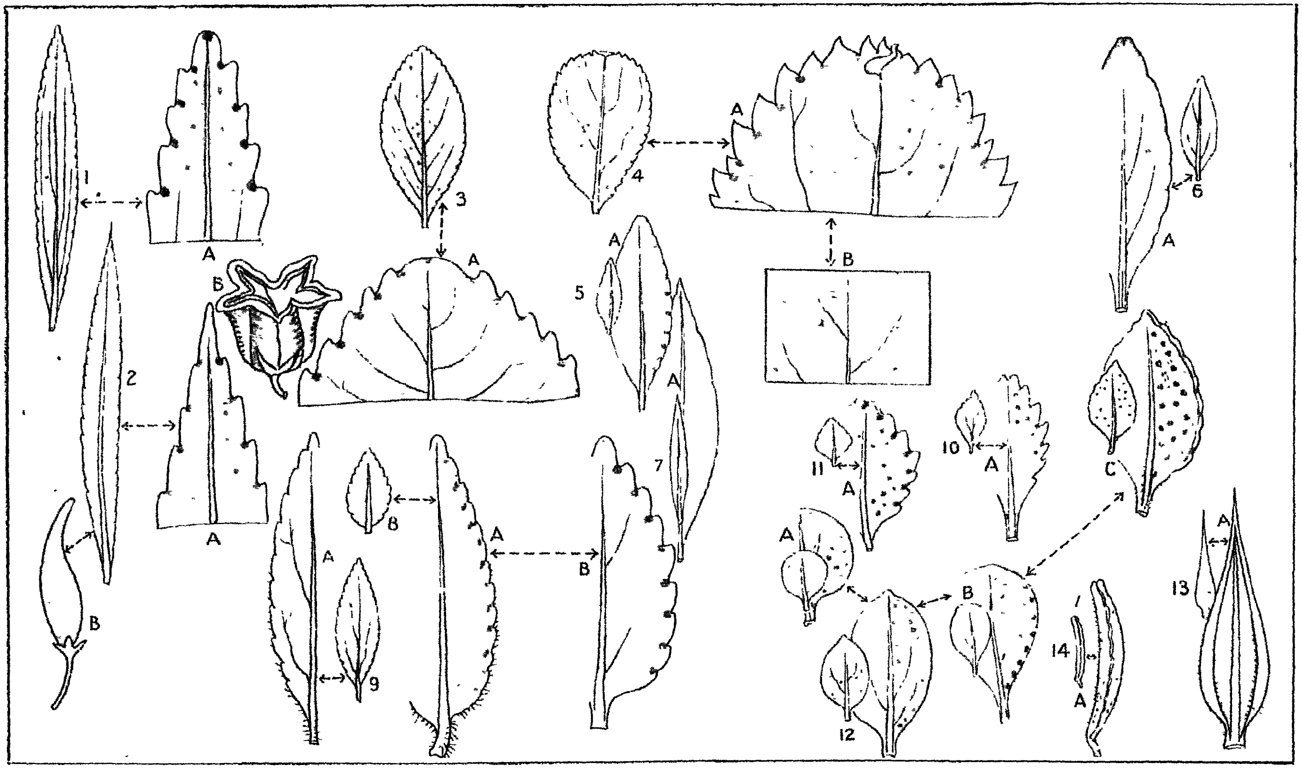



*Plate No. IV.* Leaves of the Species and Varieties of *Barosma* (Buchus), excepting Fig. 2.

1. *Barosma serratifolia* Willd. (Long Buchu): A. Apex of leaf magnified; B. Fruit. 2. *Empleurum serrulatum* Soland. (False, Long, or Bogus Buchu): A. Apex of leaf magnified; B. Fruit 3. *Barosma crenata* Kunze (*B. crenulata*) (Oval Buchu): A. Apex of the leaf magnified. 4. *Barosma betulina* B. & W. (Round Buchu): A. Apex of leaf magnified; B. Upper surface of the leaf showing prominences. 5. *Barosma scoparia* E. & Z: A. Magnified. 6. *Barosma peglerae* Dümmer: A. Magnified. 7. *Barosma lanceolata* Sond: A. Magnified. 8. *Barosma latifolia* B. & W. and *B. pulchella* B. & W. (Citronella Buchu): A. and B. Magnified respectively. 9. *Barosma latifolia* var. *longifolia* Dümmer: A. Magnified. 10. *Barosma venusta* E. & Z.: A. Magnified. 11. *Barosma venusta* var. *Harveiana* Dümmer: A. Magnified. 12. *Barosma ovata* B. & W.: A, B, and C. Forms. 13. *Barosma pungens* E. Mey. (upper surface): A. Magnified, lower surface 14. *Barosma microcarpa*, Sond.: A. Magnified.

the plant was dormant—that is between March and the winter months. I left those regions for the Karroo and subsequently the Transvaal, and then abandoned the study of the buchu plant; but from 1875 to 1883 sufficient opportunity was afforded me to watch the development and growth of these valuable shrubs. As a land surveyor I surveyed many farms on and adjoining the mountains running south from Van Rhynsdorp to Caledon, and also to Worcester; and, being a lover of botany, I could not help continually examining the buchu shrub when I was living in the Tulbagh, Piquetberg, and Clanwilliam districts.

I returned to the Paarl again in 1903. No sooner was I there than I again came in touch with buchu, but this time it was only with the kloof or fountain buchu (*Barosma serratifolia*). In my leisure hours I studied the habits of this species, which grew on the farm De Hoop. In March I pulled up three plants out of the wet ground and planted them the following day separately in small tins, and all these grew. The following year I made a plantation, with the object of making some profit out of buchu, and set out on a piece of trenched ground 1300 young plants, but these were afterwards collected by coloured people, and the roots not only were badly injured by their being pulled out, but they also suffered through exposure. In spite of all this bad treatment the greater number of them grew. After the winter of the same year a coloured boy brought me 600 young plants. They had already started in new growth, and, as I anticipated, not a single plant survived; but with those growing I had ample opportunity of studying this particular species, and I came to the following conclusions:—

(1) That the kloof buchu possesses greater vitality than the mountain buchu;
(2) that the kloof buchu grows more easily from cuttings than mountain buchu does;
(3) that kloof buchu is best grown in black, sandy loam; and that mountain buchu prefers a red, sandy loam.
(4) As regards manure, I drew my conclusions from the nature of the soils in which the several species grew, and experimented accordingly.

But what is further essential is: (*a*) Analyses of the different soils the buchu delights in; (*b*) analyses of the ashes of the various species of buchu; and (*c*) analyses of the oil or aromatic properties of the leaves at various stages of growth. With the above data before us we will then be able to decide which course to pursue with more or less certainty.

Now that most of the once paying buchu fields have vanished and the demand increases, with consequent considerably higher prices, farmers in the Paarl and surrounding districts have become alive to the importance of cultivating buchu to meet the market demand. It would, therefore, be very desirable if the Government would take a leading part in this new industry, which may prove as remunerative as that of ostrich feathers and be worked at very little cost. A field of buchu will practically take care of itself and does not claim the attention that vineyards or cotton fields require, nor the trouble and work grain and maize require. Three shillings per lb. will always be realized for an article well grown, well harvested, and well packed in good boxes specially made for the purpose.

The initiative that should be taken by the Government would be to start an experimental station in the Clanwilliam District, from

where the best buchu leaves are derived; and very little doubt remains that the cultivation of buchu will be readily taken up, as it affords an opportunity of earning more than a bare living. Such an experimental station would soon provide a source of income rather than prove an expensive institution.

I take this opportunity of giving my experience and the directions I deem advisable, if not necessary, in the first instance to be followed in the cultivation of buchu:—

*Description of the Plant.*—The buchu is a hardy perennial and ever-green shrub belonging to the Rue family of plants (nat. order *Rutaceae*). The name Buchu is of Hottentot origin. These plants are indigenous in the south-western portion of the Cape of Good Hope, growing in the mountainous parts of Van Rhynsdorp, Clanwilliam, Tulbagh, Ceres, Worcester, Paarl, Stellenbosch, Caledon, and Malmesbury. There is some resemblance between it and the myrtle, and this is the description of the flower: The calyx is equally five-parted; the petals are five in number and are oblong; the stamens are ten in number. The leaves, to which the value of the plant is due, are opposite or scattered, cereaceous, flat, dotted with oil glands; the margins are glandulary, serrated, or may be almost entire revolute. The leaves when touched or when dry emit a strong aromatic odour, hence the technical name of *Barosma* (Greek: *Barus*, heavy; *osme*, smell). This odour is due to a volatile oil contained in the glands, which are visible on both sides of the leaves, and when diffused in the air may be smelt some distance off. The colour of the oil is greenish-yellow when pressed out of the cells. The oil when left to dry leaves a camphor-like substance behind. The taste of the leaves is slightly astringent and bitter; this bitter substance acts beneficially on the stomach.

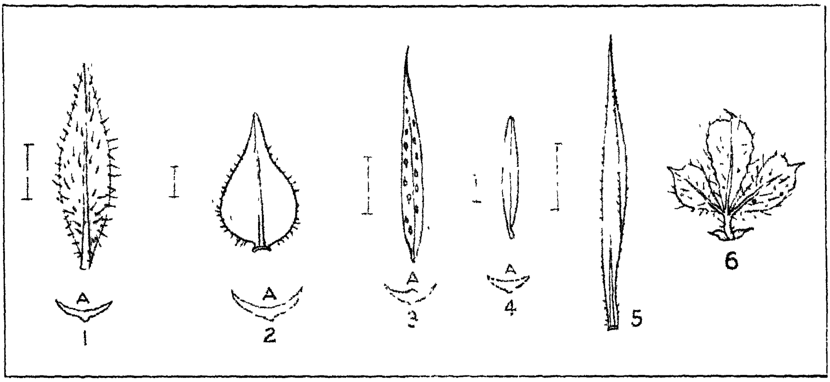
*Varieties.*—There are three species used in medicine; they differ somewhat in the shape, appearance, and colour of the leaves, but they all contain the same essential oil and camphor to which the plant owes its medicinal value.

(1) Kloof Buchu (*Barosma serratifolia*). This species is also sometimes called "fountain buchu," on account of the fact that it delights to grow in a soil somewhat moist, but not wet. Its average height is four feet, but it sometimes attains the height of ten feet. It thrives in kloofs, amongst other shrubs and granite rocks, also under the shade of trees, and it is to be found in altitudes varying from 500 to 1000 feet above the sea. It is generally found on a black, sandy loam, containing plenty of decayed vegetable matter. The colour of the leaves is dark green, like that of the orange tree, and, like the last-named, they show glands in the lamina of the leaves, but these buchu leaves are only the size of the ordinary myrtle leaves. The star-like flower is purple or mauve-tinted, and is one inch across. The kloof buchu is considered the second best.

(2) Mountain Buchu (*Barosma betulina*). This species is also known as "honey buchu," and is undoubtedly the most valuable, as it contains the greatest number of oil glands in its smaller, light-green tinted leaves. It is more compact and dwarf-like than the kloof buchu, growing three or four feet high. It is found on mountain slopes at an altitude of between 1000 and 2000 feet above sea-level, and is fortunately more abundant than any of the other buchu species. It grows in a red, sandy loam, amongst red sandstone and quartzite.

(3) Large-leaved Buchu (*Barosma crenulata*). This species has larger leaves than any of the others, being 1 to 1½ inches in length, and they are of a smooth, leathery texture, oblong ovate in shape, with serrate or granulate margins. The oil glands are visible on both sides of the leaves. This sort of buchu is not so widely distributed, and is not so well known.

*Soil.*—It is altogether a mistaken idea to think that buchu will thrive on any kind of soil. In its native state it is never found amongst limestone, neither on brackish nor barren sandy soils and stiff clays, but on black or red sandy loam (according to the species) impregnated with decayed vegetable matter, especially so in the case of the kloof buchu. The best results were obtained with cultivation on sandy loam, properly drained and dug deep, and not irrigated by brackish streams.




Leaves of *Spurious Buchus* (magnified, except 6).

1. *Agathosma villosa* Willd. (Aniseed Buchu): A. Cross-section of the leaf (the line to the left indicates the natural size). 2. *Agathosma imbricata* Willd. (Dinne Buchu): A. Transverse section of the leaf. 3. *Agathosma commutata* Sond.: A. Transverse section of the leaf. 4. *Agathosma virgata* B. & W.: A. Transverse section of the leaf. 5. *Diosma vulgaris* Schlecht (Grass Buchu). 6. *Psoralea obliqua* E. Mey. (False-round Buchu); natural size.

*Manure.*—Decayed leaves and vegetable refuse, mixed with wood-ashes, seem to be the natural manure, and the application of old cattle manure, well incorporated with the soil in the first instance, promotes healthy leaf growth. For an annual autumn top dressing for kloof buchu, the best compost is: three parts leaf mould, one wood ashes, half superphosphate of lime, and three fermented cattle manure. Mix well and leave in a heap for a month at least before application. As a manure for mountain buchu substitute basic slag (Thomas' phosphate) for the superphosphate of lime, since the phosphate of iron seems to act more beneficially on this species than superphosphate of lime.

*Propagation.*—The buchu can be grown (*a*) from seed, and (*b*) from cuttings. (*a*) The seeds of the buchu ripen in January and February; it is therefore best to sow in March, April, and May before it gets too cold. The sowing may take place either in boxes or beds. If sown in boxes, fill these with a compost of vegetable mould and sand in equal parts, burying the seeds about half an inch deep; put

in the shade in a warm place, and keep moist but not wet. In a few weeks' time the seeds will spring up. Now the boxes may be shifted to receive the morning sun. They require no further attention than protection from sharp frosts and cutting winds; they must be kept moderately moist and free from weeds. If the seeds are sown in beds, these beds should be deeply dug, and some of the soil should be removed and replaced by vegetable mould and sandy loam. It is as well to place boards on the edges of the beds, or else pile a wall of stones or sods round them, 12 to 18 inches high; cover lightly with branches to admit light, but not too much exposure to rays of the sun at first. When the seedlings appear allow them more light, and when the plants are an inch high remove the side walls, but leave some shade so as not to expose them too much to a baking sun. It is well to leave the plants where they are till the following March and transplant them in nursery rows after the first good rain has fallen when the atmosphere will not be so dry and scorching.

(*b*) As in the case of all plants of the Rue family, the buchu will grow easily from cuttings from old wood of the previous year's growth. When only a few plants are wanted, plant the cuttings in pure, moist river sand, in a box, without the addition of any soil or manure; place over the cuttings bell glasses or large tumblers, and air them once every morning by taking off the glasses and drying them. In a few weeks the cuttings will have struck root. Where many plants are wanted, plant the cuttings 4 inches each way in a bed of pure river sand, and treat them in same manner as recommended for seed beds.

*Transplanting.*—The ground should be trenched or ploughed at least two feet deep, to induce deep-rooting. If the ground be stony the loose stones could be buried at the bottom of the trenches. Place the plants 5 feet apart each way in the ground; this will leave ample room for the cultivator to pass between the rows. The best time for transplanting is when growth is dormant, namely, from March to May, after a soaking rain (this, of course, refers to the Cape Province, where the buchu is indigenous); where it does not rain during these months the ground must first be irrigated. It must be borne in mind that the buchu is an evergreen plant, that it will flower in October and November, that its growth is dormant from the time it has shed its flowers (which occurs in November), that the seeds are ripe in January and February, and that no renewed growth takes place till after the rains have fallen in May, and sometimes later. From this it must be inferred that the only suitable time for transplanting is from March until the plant starts new growth. This accounts for most of the failures where people have planted in other periods of the year, unless the seeds are planted separately in small tins; in the latter case transplanting can take place at any time of the year. In taking up the plants from the boxes or beds, great care must be exercised not to injure the roots. Plants can also be taken from the open veld where the seeds have sprung up, but then they should not be taller than six inches. After the plant is in the soil be sure to press the earth firmly about the roots with the foot, leaving a hollow basin round it into which water can be led when necessary until the plant has made a fair start in growth.

*Culture.*—After planting is completed, no other care is necessary but to weed and rake the surface soil occasionally, so as to conserve moisture. This should be done very lightly so as not to injure the

roots which are close to the surface of the ground. It must be remembered that buchu spreads out its roots in all directions like the cabbage, and these roots are not as firmly anchored in the ground as are those of other shrubs. This is why the plants can be uprooted without difficulty.. By deep trenching the roots are induced to penetrate more deeply into the soil. After the first rains have fallen in March, spread the compost as recommended above over the land, and rake it in well so as to enable it to mix thoroughly with the surface soil. A top dressing once in three or four years, consisting of nitrate of potash, has proved most beneficial, as it promotes leaf growth.

*Harvesting.*—When the leaves are gathered in the wrong season their value deteriorates and this practice will also destroy the plant in a comparatively short time. The time the leaves contain the most oil is in January or February, that is, when the seeds are on the plants; though this is the best time for gathering the leaves, the seeds are unfortunately then sacrificed, which is detrimental to future propagation. The most judicious plan to follow would, therefore, be to postpone harvesting until most of the seeds have fallen, namely, at the end of February and the beginning of March. The cutting should take place, not with sickles, but with pruning shears, for in cutting off the boughs or branches care must be taken to leave sufficient buds on the remaining part of the stem to ensure the healthy future growth of the plant. It is obvious that such a proceeding could not be followed when sickles are indiscriminately used. A skilled workman with scissors will do the work with great dexterity. Immediately the twigs are cut they should be put in baskets and removed to drying barns under the shade of trees, or spread open in lofts or large rooms to dry. Care should be taken that no rain or dew falls on the leaves in their drying stage, for this causes discoloration or bleaching; likewise, if the drying takes place when the leaves are exposed to the direct rays of the sun they will bleach and be deprived of their most valuable volatile oil. No time should therefore be lost after the leaves have dried in separating them from the branches and placing them at once in boxes or damp-proof bags (for in ordinary grain or wool bags they lose much of their volatile substance). When packed, the leaves should be thoroughly dried, otherwise they will start fermenting and depreciate in value.

The question now arises as to when and how often to harvest. The first pruning of the plantation should be done six inches above the ground, leaving sufficient buds to encourage increase of new branches. Harvesting can be performed every year if judiciously carried cut, provided the plants are vigorous and strong, but if they show any signs of weakness, harvesting should be resorted to every alternate year. In the meantime the land should be stimulated with a rich compost, ashes and manure; this is best done before the winter. The top-dressing of nitrate of potash could be applied after the winter. It is evident that, if the land is well cared for, the product will be heavier, and better prices will be realized. Leaves of one year's growth are far superior to those two years old.

*Uses.*—Buchu is employed in the flower garden as an ornamental plant, and compares favourably as a rival with the Gardenia and Camelia. Its starlike and purple flowers make a pretty exhibition, while the green and shining leaves add to the beauty of the shrubbery.

The Hottentots and Bushmen discovered the value of the leaves as a medicine, and they also used the roots for snake bites. Soon after

the European settlement at the Cape of Good Hope, the whites also became acquainted with their healing value in all bladder and kidney complaints. They are a valuable diuretic and stomachic. The leaves are treated by making an extract in alcohol or boiling water. The British Pharmacopœia contains an infusion and a tincture, but since the infusion does not contain the oil of the buchu it is not of great value, in fact, the careless way in which the leaves are packed and exported to Europe causes them to lose much of their valuable properties in transit. The full value of the article is thus not brought before the public. It is lamentable indeed to record the fact that the dried leaves of buchu are adulterated by unscrupulous persons, for the mere object of gain, with the leaves of an allied shrub of very similar appearance, namely, with the *Empleurum serratulum*, which neither contains the oil nor possesses the properties of buchu. This fraud, of course, can only serve to depreciate the true value and properties of the buchu leaf.

# Insect Notes.

## EXTRACTS FROM REPORTS OF THE ENTOMOLOGICAL DIVISION.

THE following extracts from the April and May departmental reports of the Chief of the Division of Entomology are of general interest:—

### REPORT FOR APRIL.

*Locusts.*—That migratory locusts are not entirely absent from the settled parts of the Union was evidenced by a few reports of their presence from private parties during the month under review. Mr. Leopold Krantz, of Badfontein, Lydenburg District, Transvaal, sent in an adult red wing locust (*Cyrtocanthacris septemfasciata*) he had captured locally in late March. It is this kind of plague locust that from time to time ravages the eastern part of the Union. Mr. Krantz had seen only the one specimen and stated that he had made inquiries but had failed to get any proof that a swarm was about. Under date of 19th April, Mr. John E. Biggs, of Graaff-Reinet, reported that while travelling three days before between Baroda and Tafelberg Stations (Middelburg District, Cape), his train had passed through a swarm of locusts, and that after leaving the train he had observed hoppers and newly winged locusts to be prevalent for a number of miles along the road, eastward from Tafelberg Station. At the end of the month what was with little doubt the same swarm was reported by Mr. E. T. Gilfillan, of Conway Farm, Conway, between Baroda and Tafelberg, as having been seen by him on 17th and 29th. Mr. Gilfillan

stated that the swarm was spread over about twenty square miles, that the sexes were pairing, and that the species was like the ordinary migratory one (brown locust, *Locusta pardalina*, better known as *Pachytylus sulcicollis*), except that it had green bands about the head. Up to the time of writing this report I have not succeeded in getting specimens for identification, but the species, to judge from the mention of markings in Mr. Gilfillan's note, is probably *Locusta danica*, a swarm species which has not often been recorded in South Africa. An effort will be made to keep track of the swarm with the view of getting action taken to effect the destruction of the succeeding generation while the voetgangers are still small. I am not now able to explain how it chanced that the present generation reached the adult condition before being reported, but it may be that the swarm occupied only an insignificant area and quite escaped intelligent notice until the insects were full grown. The police in the Cape Province are under instructions to report any occurrence at once and a "return" is rendered by each patrol station every month.

*Fruit Moths.*—Fruit moths (*Ophiuza lienardi* and perhaps other species) appeared in some coastal fruit gardens in enormous numbers late in the month. One very serious report reached the office from Lourenco Marques and another from East London. These moths puncture sound fruit with their proboscis and suck the juices, thereby ruining it.

*Bagrada Bug.*—This periodic pest (*Bagrada hilaris*) was more commonly the subject of complaint in inquiries received at the office during April than any other insect. Most of the complaints were from residents of Pretoria and its environs, but many came from in and around Johannesburg, and some from Lydenburg, Rustenburg, Warmbaths, and other outlying parts of the Transvaal. The insect is commonly mistaken for a ladybird, owing to its size, general form, and markings, but the resemblance is very superficial. It attacks cruciferous plants, chiefly such as stocks and candytuft amongst flowering plants, and turnip, radish, mustard, rape, cabbage, and cauliflower amongst vegetables, and it quite commonly weakens the plants to such an extent by its extraction of their sap that they wilt down and perish. Large fields of rape and turnips are sometimes a total failure through this cause. Strong contact insecticides, such as soap at the strength of ten pounds to twenty gallons of water, are fatal to the insect, but because of the nature of the affected plants and the enormous numbers in which the insect occurs spraying is not usually a practicable remedy.

*Lucerne and Lawn Pest.*—A caterpillar (*Caradrina exigua*) which, because of its fondness for pigweed, was given the popular name Pigweed Caterpillar, by C. W. Howard, some years ago, is at the present time very troublesome in new lawns in Pretoria and as a farm pest over a considerable area in the south of the Transvaal. It is a dull-coloured hairless caterpillar which, when full grown, measures only about one and a quarter inches in length and which in its short life is remarkably voracious. It is recorded to feed on a very wide variety of plants and has gained a reputation as a periodic pest to different crops in several parts of the world. Several generations occur in a season. On the present occasion it is specially injurious to grass and to lucerne. Extensive fields of lucerne at Magaliesberg, Heidelberg, Irene, and Crocodile River (Pretoria District) are reported to have

been eaten bare, and always the lucerne has been of the present season's sowing. Some of the lands have been ploughed over and planted to grain. At Magaliesberg a strenuous effort was made to save the young lucerne by spraying with arsenate of lead and paris green but without satisfaction, despite of the use of excessively strong mixtures. Probably many worms were fatally poisoned, but the fact remains that the lucerne was completely eaten down and kept down. Spraying lucerne against caterpillars is generally unsatisfactory, because the worms are most likely to feed on the unpoisoned tips which open out after a treatment. The Pretoria Town Engineer invoked the aid of the Division to save the newly made lawns in Church Square and the Eastern Sports Grounds, and aid was also given to a few private parties. It seems probable that new lawns suffer much more than old ones, because of the soil underlying the former being softer and the mat of grass stems being less dense, conditions which probably enable the worms to secrete themselves more effectively from insectivorous birds. The spraying of lawns with arsenate of lead or paris green is effective if the poison is thoroughly applied before the injury has proceeded far, but it is useless when the grass has been eaten down to the hard stems, there then being nothing edible for the poison to adhere to and the worms subsisting on the little growth that is made during the hours when they are at rest. Infested lawns may be thus kept fed down to the hard stems week after week, and this is at present the condition of many lawns in Pretoria and doubtless in some other Transvaal towns. To enable the Division to recommend a treatment based on actual experience trials with "poisoned bait" were made, formulas as follows being used:—

| 1. | | | 2. | |
|---|---|---|---|---|
| Bran ... ... | 20 lb. | | Bran ... ... | 20 lb. |
| Sugar ... ... | 4 lb. | | Sugar ... ... | 8 oz. |
| Paris green ... | 1 lb. | | Paris green ... | 4 oz. |
| **3.** | | | **4.** | |
| Bran ... ... | 20 lb. | | Bran ... ... | 20 lb. |
| Sugar ... ... | 4 lb. | | Sugar ... ... | 4 lb. |
| White arsenic ... | 1 lb. | | Arsenate of lead paste ... ... | 1 lb. |

In the use of formulas 1, 2, and 3 the sugar was dissolved in a little water (about a gallon) and the liquid used to dampen the bran before the poison was gradually worked into the mass. This procedure is necessary to ensure a uniform distribution of the poison. The arsenate of lead had, of course, to be mixed with the water. Paris green baits are the easiest to prepare and the green colour is an advantage for several reasons. The bran was merely dampened, it being deemed desirable to have the particles separate, not adhering in masses, for the particular purpose. The baits were broadcasted in the late afternoon so that they would be soft through the night, and were all used at the rate of about 100 lb. to the acre. All gave satisfactory results, live worms apparently disappearing completely, and the new growth of grass after a couple of days showing very little, if any, indication of attack. The effect of the arsenate of lead bait was slower than that of the other baits in manifesting itself. For the treatment of lawns, in which the extra expense is a minor consideration, I think it best to use bait of the composition shown in the first

formula. Such a bait acts very quickly, a large proportion of the worms succumbing to it by the morning following its application. A bait of the composition given in the second formula, used at the rate of 50 lb. to the acre, is recommended in Canada for use against caterpillars in grain lands. It is probable that dry horse manure would answer as a substitute for bran.

*Codling-moth Regulations.*—Despite all the trouble taken to acquaint the public with the prohibition on the removel of apples, pears, and quinces into certain areas of the Union petty contraventions continue to take place. During April five cases were reported to magistrates with a request that action be taken against the offending party. The offences would not have occurred had it not been for negligence on the part of a railway officer at the forwarding station, but this fact is not accepted as excusing the sender.

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## REPORT FOR MAY.

*Codling-moth Regulations.*—Five infringements came to the notice of the Division during the month. All were petty ones and doubtless due to ignorance of the regulations and to negligence by railway receiving officers, but, in accordance with Departmental instructions, each one was reported to the magistrate of the district in which the infringing party is resident. One conviction (£1, or fourteen days) was secured. The station staffs at the chief Transvaal stations in the protected areas now seem to be very alert, and parties who succeed in getting prohibited fruit accepted for conveyance are very likely to find that their success is unfortunate in that they ultimately lose the fruit and are called to account before a magistrate. A railway poster, prepared by this Division, now informs the public what sections of line are in closed areas.

*Nursery Inspection.*—Two nurseries were placed in quarantine during the month. Those in quarantine up to the actual date of submitting this report are as follows:—

*Nurseries under Quarantine to 23rd June, 1913.*

| Occupier. | Address. | Extent of Quarantine. | Reasons for Quarantine. | Quarantine Imposed. |
|---|---|---|---|---|
| Dixon Bros. & Riddin | Martindale, C.P. | All citrus trees ... | Red Scale ... ... | 6/5/13. |
| Templeman, R.... | Rosebank, C.P.... | Whole nursery ... | Red and Round Purple Scale | 20/5/13. |
| Black, J. E. L. ... | Clifton, near East London, C.P. | Whole nursery ... | Red and Round Purple Scale | 14/8/12. |
| Leighton, W. ... | Amalinda, near E. London, C.P. | All citrus trees and palms | Red and Round Purple Scale | 19/4/13. |

| Occupier. | Address. | Extent of Quarantine. | Reasons for Quarantine. | Quarantine Imposed. |
|---|---|---|---|---|
| Paarl Municipality | Park, Paarl, C.P. | Whole nursery except conservatories | Red Scale ... ... | 20/5/13. |
| Deane, W. S. ... | Johannesburg ... | Whole nursery ... | Ross Scale... ... | 30/4/13. |
| Ellis, T. Lloyd ... | Johannesburg ... | Whole nursery ... | Red, Ross, and Grey Scales | 28/6/12. |
| Lane, C. E. ... | Johannesburg ... | Palms and dracaenas | Ross Scale... ... | 30/4/13. |
| Shakeshaft, G. H. | Johannesburg ... | Whole nursery ... | Ross Scale... ... | 9/4/13. |
| Weiner, H. ... | Johannesburg ... | Whole nursery ... | Ross Scale... ... | 29/4/13. |
| Du Plessis, J. M. | Rustenburg, T.P. | All citrus trees ... | Red Scale ... ... | 26/3/13 |
| Du Plessis, T. C. | Rustenburg, T.P. | All citrus trees ... | Red Scale ... ... | 26/3/13. |
| Humphries, H. B. | Brits, T.P. ... | All citrus trees ... | Red Scale ... ... | 26/3/13. |
| Todd, A. E. ... | Maritzburg, Natal | All citrus trees ... | Red and Mussel Scales | 14/8/12. |
| Ducasse, Leon ... | Hillary, Natal ... | Whole nursery ... | Red, Round, Purple, and Mussel Scales | 21/4/13. |
| Perold, J. F. ... | Paarl, C.P. ... | All citrus trees ... | Red Scale ... ... | 16/6/13. |
| Malherbe, P. J. | Paarl, C.P. ... | All citrus trees ... | Red Scale ... ... | 16/6/13. |
| Joubert, D. J. ... | Ceres, C.P. ... | Portion of pear stock | Red Scale ... ... | 18/6/13. |
| Joubert, S. W., & Sons | Wellington, C.P. | All citrus trees ... | Red Scale ... ... | 18/6/13. |
| Marais, P. J. ... | Wellington, C.P. | All citrus trees ... | Red Scale ... ... | 18/6/13. |
| Knab & Co. ... | Stellenbosch, C.P. | Whole nursery ... | Red Scale and Woolly Aphis | 18/6/13. |

*Note.*—Ferns, carnations, vegetable and flowering transplants, bulbs, etc., were not included in any quarantine, and the term "whole nursery" is not intended to include these plants. Red Scale is *Chrysomphalus aurantii*; Round Purple Scale, *C. aonidum*; Mussel Scale, *Lepidosaphes becki*; Ross Scale, *Aspidiotus rossi*; and Grey Scale, *A. africanus*.

This list will probably be extended during the coming month by the addition of some nurseries amongst a number which remain to be re-inspected. Up to this time quarantines have not been specifically reported, but I now feel that the public should know what nurserymen are failing to keep pests out of their nurseries. It must be confessed that very few fruit tree and palm nurseries have been found quite free of one or another of the pests for which quarantines are imposed, but in most cases the action taken against the pests when their presence has been notified has been all the Division could reasonably require.

*Locusts.*—The swarm or swarms reported last month in the Middelburg District, Cape Province, have laid eggs on half a dozen or more farms. The area infested is thought to be roughly a triangle with Middelburg, Schoombie, and Fish River as the three corners. The swarms were not dense, and the damage done appears to have been trivial. Arrangements will be made for the suppression of the voetgangers which may be expected, but there is a fair chance that birds will scratch out and devour most of the eggs. There is a little doubt about the identity of the species, but if it is not the common brown locust (*Locusta pardalina* equals *Pachytylus sulcicollis* equals *P. capensis*), it is a very close relative. Both sexes average smaller than the brown locusts I have preserved; the fore wings are relatively narrow, and the black blotches on them are larger but fewer in number; there is a bluish cast at the base of the hind wings, and there are other slight differences. Farmers say some of the adults were

marked with green about the thorax, but I have not seen such specimens. The green colour may have disappeared with age, and difference in age at the time of collection may perhaps account for colorational differences between the specimens I have seen and the specimens from former years with which I have compared them.

*Fruit Fly Parasites.*—In a previous report, mention was made of a visit by Professor F. Silvestri, an eminent Italian entomologist, who, on behalf of the Hawaaian Island Government, spent some time early in the present year on the west coast of Africa in quest of parasites of our fruit fly (*Ceratitis capitata*). Mr. Silvestri visited South Africa en route to Hawaai, and in return for assistance rendered to him he was good enough to leave the Division a few specimens of each of four of the species of parasites he had found. Two of these we have succeeded in carrying through two generations, and there is a chance that we may be able to carry them through the winter and then be able to establish them out of doors on the coast of Natal if not in cooler parts of the Union. They attack and destroy the maggots after these leave the fruit and enter the soil. As they came from a distinctly tropical region, it is hardly probable that they would flourish well in the Union, but, despite the considerable labour involved, it is considered worth while to attempt their establishment. It is exceedingly difficult at this time of year to find fruit fly maggots to offer to them.

*Sugar-cane Leaf Binding Caterpillar.*—On 15th May we received a telegram to the effect that practically every plant in 10,000 acres of cane around Mount Edgecombe, Natal, was infested and threatened by a previously unknown caterpillar pest. Mr. Fuller was sent to make observations, and his report on the subject has since been sent to the *Agricultural Journal* for publication. The trouble is a previously unknown one, but it appears not to be really serious. Up to the time of writing, a full month after collecting, none of the caterpillars have transformed, and the identity of the insect remains undetermined.

*Fly Pest on East Coast.*—The heavy floods that occurred along the Zululand, Natal, and Pondoland coast in late summer were followed, during May, by an extraordinary abundance of *Stomoxys* and *Simulium* biting flies greatly to the distress of stock. A note on the subject, prepared by the Division, was issued by the Department to the newspaper press, and a note in greater detail has been sent to the *Agricultural Journal* for publication. Flies of both the species mentioned are of widespread occurrence in the Union.

# Dik-voet, Club-root, or Finger-and-toe (*Plasmodiophora brassicae*, Woronin) in South Africa.

By I. B. Pole Evans, M.A., B.Sc., F.L.S., Chief, Division of Plant Pathology and Mycology.

Dik-voet, club-root, or finger-and-toe is a disease which occurs in cabbages, cauliflowers, turnips, and other cruciferous plants in most agricultural countries throughout the world. It is now recorded for the first time from South Africa, where it has undoubtedly passed unnoticed for the past ten or fifteen years under the name of dik-voet.

It was brought to the Department's notice by Mr. A. Brink, of Kruispad, Brakenfel, Cape Province, who wrote to this *Journal* in April last and asked that measures should be taken against dik-voet which occurred in cabbage and cauliflower, and which attacked them most severely from December to April on all moist ground.

Specimens of cauliflower suffering from dik-voet were then sent to this laboratory by Mr. A. Brink for examination, and the disease was readily recognized as being due to the organism *Plasmodiophora brassicae*, Woronin, the cause of club-root or finger-and-toe.

As no previous authentic record of the occurrence of this pest in South Africa was known, Mr. P. A. van der Byl, B.A., on the staff of this Division, was immediately dispatched to the scene of the infected area in the Cape Province to obtain all local information regarding the outbreak, and as a result of inquiries made, Mr. Van der Byl reported that dik-voet was widespread and well known to the farmers around Stellenbosch, Bottelary, and Kuils River, and, further, that the trouble had been prevalent for the last twelve or fifteen years.

It is somewhat surprising that such a conspicuous disease as this, occurring as it would seem for the past fifteen years in the vicinity of Capetown, should have passed so long unnoticed by agricultural experts, and it only serves to show that unless farmers and fruit-growers are not more ready to bring such matters to the Department's notice serious diseases may easily become firmly established and cause considerable monetary loss before any steps can be taken to cope with them.

For, in this particular instance, there is not the slightest doubt but that if the disease had been identified years ago and the liberal application of lime recommended, cabbage-growers in the Cape would not be faced with such difficulties as they are experiencing to-day in raising their crops.

That dik-voet is a world-wide disease will be readily realized when it is stated that it is commonly known under the following names: In Britain, as finger-and-toe, club-root, anbury, and grub; in France, as maladie digitoire, gros-pied, and hernie du chou; in Germany, as knopf and kohlhernie; in Belgium, as vingerziekte; in Dutch-speaking countries, as klinker, knol, knolvoeten, knolziekte, and kwabziekte; in Russia, as kapoustnaja kila; in the United States, as club-foot, club-root, clump-foot, and clubbing.

In South Africa it is known simply as dik-voet, and at present appears to be confined to the south-western portion of the Cape Province. It has been actually obtained from Stellenbosch, Bottelary, and Kuils River. In these parts the farmers regard it as a very serious pest and say that it is no uncommon thing for all their cabbage seedlings to be infected.

*Plate No. V.* CAULIFLOWER SEEDLINGS SHOWING DIK-VOET. (*Plasmodiophora brassicae*, Woronin.)

The disease is readily recognized by the presence of large tubercular swellings on the roots which become somewhat finger-like in appearance. As a rule a distinct enlargement of the main root takes place. It is only the root system that is attacked, and this soon rots and has a very characteristic fœtid smell. The plants are nearly always infected during the seedling stage, and the disease usually makes itself visible in about three to five weeks after sowing, when the young plants turn a sickly yellow colour and droop.

Infected seedlings are shown in Plate No. V, while Plate No. VI, shows the general appearance of the disease in full grown plants.

It seems probable that the disease is spread from place to place by contaminated seed, soil, or manure.

Authorities in Europe and America agree that the disease has increased considerably during the past fifty years, and this increase is attributed to the general use of artificial manures which have largely taken the place of lime, for it has been proved that the presence of acids in the soil greatly favours the development of dik-voet, whereas alkaline soils inhibit its growth.

Dik-voet is consequently very liable to do considerable damage in soils deficient in lime, and a liberal application of lime is therefore the best and most practical preventive of dik-voet.

The application of lime and frequent rotation of crops are the measures most commonly adopted in dealing with the pest. Five to seven tons of lime are usually recommended and should be applied from six to eighteen months before sowing, while a dressing of two tons of lime per acre has proved beneficial after the removal of diseased crop.

One of the most effective methods of dealing with the pest in the case of cabbages and cauliflowers is during or just after transplanting, when the soil around each foot should be removed to a depth of about two inches and a good handful of quicklime should be placed in the hole and then covered over with soil to the ground level.

Although turnips suffer most in England from this pest, Mr. Van der Byl reports that the Cape farmers have not seen dik-voet in this crop. Be this as it may, it seems hardly necessary to point out here that it would be extremely unwise to plant turnips or other root crops on ground which had produced diseased cabbages or cauliflowers.

Dik-voet or club-foot was first recorded from Scotland about 1789, but it was not till the year 1878 that the cause of the trouble was first worked out by the Russian botanist, Woronin, of St. Petersburg, who estimated that in the vicinity of this city alone the loss due to club-foot amounted to close on £50,000 in the year 1876.

Woronin showed that club-foot was due to a microscopic organism which invaded the roots and which he named *Plasmodiophora brassicae*.

*Plasmodiophora brassicae*, Woronin, belongs to a group of organisms which are commonly known as slime fungi, and which are regarded as being on the border-land between the animal and plant kingdoms. This particular organism naturally inhabits the soil, and its life history may be briefly summarized as follows:—

The organism in the soil enters the plant through the delicate root-hairs and from thence invades the root.

It immediately stimulates the root-cells into activity, causing an increase in their size and numbers, the result of which is the formation of the wart-like excrescences and thickening of the root. In these cells the parasite increases rapidly in numbers, completely filling them, and, at the same time, absorbing their substance. The exhausted plant sooner or later dies, and as soon as the root starts rotting it liberates countless millions of resting organisms into the soil. These lie dormant in the ground until favourable conditions offer, and then each one is capable of renewing further infection.

*Plate No. VI.*

CAULIFLOWER PLANTS SHOWING DIK-VOET.
(*Plasmodiophora brassicae*, Woronin.)

From the above it should be evident that in endeavouring to control the disease it is most important to remove and *burn* all infected plants before they have had an opportunity of rotting in the ground and spreading infection. In dealing with this pest the following measures are recommended:—

1. Lime all seed beds thoroughly, using 5 to 6 tons per acre at least six months before sowing.
2. Pull up, remove, and burn all plants that show any signs of turning yellow and have swollen roots.
3. On no account plant out unhealthy plants.
4. Plant out if possible on hill-sides or on well drained land; avoid damp sandy vlei ground.
5. During or after transplanting, place a good handful of quick-lime around the foot of each plant to a depth of 2 to 3 inches, and then cover with soil to the ground level.
6. Remove and burn all plants showing dik-voet before they begin to rot in the ground.
7. On no account feed infected plants to animals or throw them on the manure heap.
8. As soon as an infected crop has been raised, treat the ground with at least two tons of quicklime per acre.
9. Practice rotation of crops as much as possible and avoid planting cabbage, cauliflower, turnips, etc., in infected land for at least five or six years.

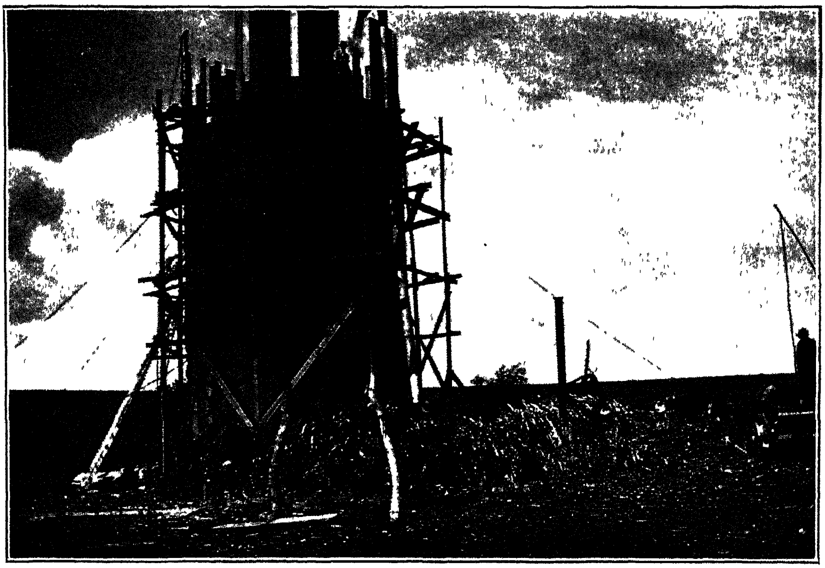
## An American Silo in the Transvaal.

### WHAT AN ENTERPRISING FARMER HAS DONE.

THE hon. secretary of the Davel Farmers' Association writes:—

It might be of interest to the readers of the *Agricultural Journal* to glean some information regarding a wooden (stave) silo of large dimensions which has recently been erected on the farm of Mr. C. F. Krauss, at Davel, in the Ermelo District. This is a circular-roofed structure, 40 feet by 20 feet, designed to hold about 260 tons of ensilage, and is therefore the largest silo erected in South Africa. Indeed, on looking through a descriptive pamphlet issued by the makers—the Harder Manufacturing Company, Cobleskill, New York (represented in South Africa by Messrs. Malcomess & Co.)—it is observed to be the largest size of silo listed by them, although the factory claims to have facilities for building silos of this pattern up to 1000 tons capacity. The material used is best quality seasoned white pine; each board is dovetailed in such a manner as to form a section of a perfectly circular, tun-like chamber. The planks are 1¾ inch thick and of varying lengths, the idea being to ensure greater rigidity

for each vertical section. Around the planking for support outside, in order to counteract the outward pressure of the ensilage, hoops of Bessemer steel, ⅝-inch diameter, are placed at intervals of 3 feet, and held in position by means of malleable iron lugs, through which strong bolts are passed to strain these hoops tightly around. The bottom boards are set up on the flat top of a perfectly level foundation of concrete, standing 2 feet above ground. The metal roof consists of galvanized sheet steel supported by a heavy frame of hemlock wood, topped with a cupola ventilator. It rests on a strong frame, and is provided with a convenient door-opening for filling. Finally, a lightning rod has been fastened to the top point, with copper tape leading downward; the latter is led away and sunk into a small pool adjoining the site.



THE SILO IN COURSE OF ERECTION.

The ensilage is emptied out through a series of sliding doors, also made of strong white pine. These doors are detachable and are arranged at convenient height intervals, corresponding with the top layer of the ensilage. They also form a ladder, their wooden projections, which are used for opening and closing by means of bolts, forming rungs for the support of the hands and feet of the climber. Further to facilitate the removal of the ensilage, Mr. Krauss has now designed a square wooden chute with a hopper, through which the fodder is more easily discharged. To increase the stability of the structure itself six strong lengths of wire rope with straining bolts form a safe anchorage around the silo.

The erection from the time of transporting the timber to the site, to the completion of the silo, took three weeks, but could have been easily effected in twelve to fourteen days if strong winds had not interfered with the initial stage of fitting the dovetailed boards together. It was found advisable to tighten the steel hoops around

as the construction proceeded; also the filling of the silo was started before the roof was fitted, both with a view to facilitate the work on top of the building from the inside as well as the outside scaffolding, and to save time and give the ensilage a few days to settle. Before filling the silo, the inside walls received a double coating of Avenarius Carbolineum, and the outside walls were afterwards treated in a like manner.

For cutting the ensilage, an Ohio ensilage cutting machine and tubular elevator was used, the cut being ½-inch. Only Hickory King mealies were used for ensiling, for which 15 morgen were planted with a drill.

The following figures will give a clear record of the cost of such a silo and ensilage:—

| | | | |
|---|---|---|---|
| Cost of the silo, f.o.r., Durban ... ... ... ... ... ... ... ... ... | £180 | 0 | 0 |
| Cost of silo roof (extra) ... ... ... ... ... ... ... ... ... ... ... ... | 40 | 0 | 0 |
| 1 Ohio Monarch self-feed ensilage cutter and blower | 40 | 0 | 0 |
| 40 Feet of 8-inch galvanized piping (elevator) ... ... | 10 | 10 | 0 |
| Railage on above material to Davel ... ... ... ... ... ... | 52 | 4 | 5 |
| Cost of concrete foundation, carbolineum, lightning conductor and copper tape, wire rope and bolts for anchoring, nails, and sundries ... ... ... ... ... ... | 24 | 0 | 0 |
| Cost of erection: engineer's fee ... ... ... ... ... ... ... ... ... | 15 | 0 | 0 |
| Wages for native assistants ... ... ... ... ... ... ... ... ... ... ... | 7 | 0 | 0 |
| Total cost ... ... ... ... ... ... | £368 | 14 | 5 |

The makers claim that such a silo will last twenty years, although wooden silos of the stave pattern will last up to thirty years in the United States. Supposing the lifetime of Mr. Krauss' silo to be fifteen years only—in spite of careful coating inside and out, to be repeated whenever the silo is empty, and taking into consideration any weakening of the timber through corrosion—a depreciation of 7 per cent. per annum should be provided for, which will result in the silo being written off in amortization within fifteen years. The roof, being mainly constructed of iron, should, however, last thirty years; the concrete foundation will also last considerably longer than the timbered parts.

Coming to the cost of the ensilage itself, this may be calculated as follows:—

To fill the silo, Hickory King mealies were used, grown on 15 morgen, yielding 220 tons of ensilage.

| | | | |
|---|---|---|---|
| Cost of seed, ploughing, cultivating, and harrowing (twice), and interest on the value of acreage used | £10 | 0 | 0 |
| Loss of interest at 5 per cent. on cost of silo ... ... ... | 18 | 10 | 0 |
| Depreciation per annum of cost of silo (not including cost of roof and foundation, lasting thirty years) at 7 per cent. as shown ... ... ... ... ... ... ... ... ... ... | 22 | 10 | 0 |
| Cutting mealies by hand, native wages, and food ... | 13 | 5 | 0 |
| Hire of 8-horsepower engine for cutting and elevating, five days ... ... ... ... ... ... ... ... ... ... ... ... ... | 5 | 0 | 0 |
| 23 Bags of coal (price in Davel) ... ... ... ... ... ... ... | 1 | 3 | 0 |
| Loss of producer's profit in using about 200 bags yield of mealies for ensilage, at 3s. per bag ... ... ... | 30 | 0 | 0 |
| Total cost of 220 tons of ensilage ... ... ... | £100 | 8 | 0 |

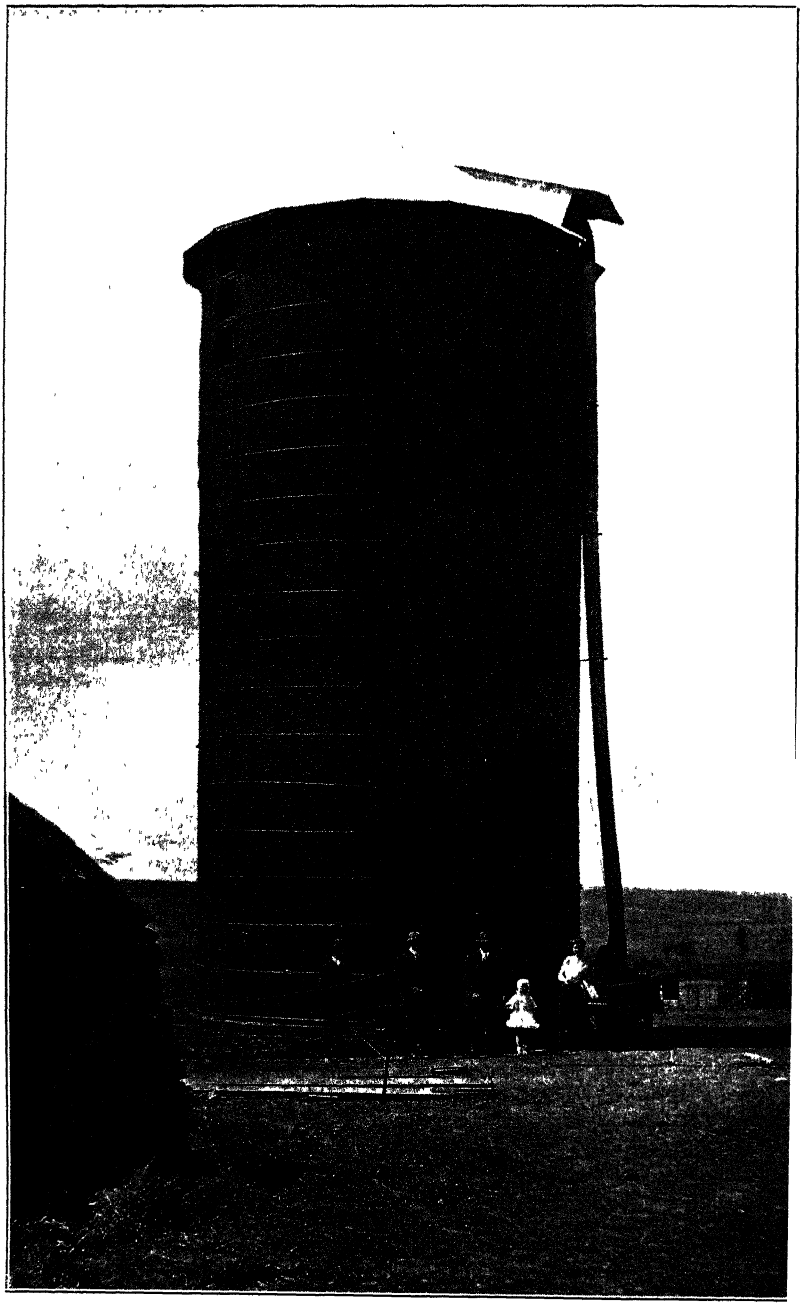


*Plate No. VII.*

AN AMERICAN SILO IN THE TRANSVAAL.
The Completed Silo.

Thus, the cost of 1 ton of ensilage is 9s. 1½d. It will be noticed that the silo has only been filled with 220 tons; had it been filled to its full capacity of 260 tons, the cost per ton would have worked out at only 8s. 6d. The average ration per dairy cow being 30 lb. of ensilage, the cost per cow per day is 1.46d.

The capacity of the silo is calculated as follows:—$20 \times 20$ (square of diameter) $\times$ 40 (height) $\times$ 0.7854 ($2 \times \pi$) = 260 tons.

It will be seen from the above records that the railage represents a very considerable portion of the cost of the silo; indeed, the amount of railage paid for the silo material and roof alone being £49. 5s. on £220 value of material, was computed at the high rate of 85d. per 100 lb. Representations were made to the railway authorities, with a view to classing silo material at a lower rate, but without success.

# The Narra Fruit.

## ANALYSES OF WALFISH BAY SOILS.

THE following report on analyses of soils from Walfish Bay will be found of interest in connection with the notes on the Narra fruit which appeared in the March issue of the *Journal*:—

*Report on the analysis of four samples of soil from Walfish Bay submitted by the Resident Magistrate of that territory during October*, 1912.

The samples in question are of soil in which the Narra bush grows. The analyses have been undertaken with a view to affording enlightenment as to the possibility of cultivating the Narra bush in places other than the vicinity of the Kuisip River, which seems to be the only locality where it is to be found.

The following information was supplied with the samples:—

The Narra fruit forms practically the only food of the Hottentots inhabiting the Walfish Bay Territory. No attempts are made by the natives to cultivate the plant, which grows in the sand dunes, has roots going down to a depth of sixty feet, and has such rapid growth that, although frequently covered with wind-blown sand, it easily grows through to the surface.

The plant appears to grow only along the bed, on the sides, and in the immediate vicinity of the Kuisip River. The natives believe that the cold fogs, which are so frequent in that territory, have great bearing on the successful growth of the plant, and that practically it grows only where these fogs occur. Yet it does not thrive at the coast, where it has been planted in sand and where fogs are of common occurrence.

Attempts have been made in other localities to raise the plant from seed, but apparently without success. Since, however, practically all the seed sent in to Walfish Bay has previously been boiled, it is possible that useless seed has been employed. Inquiries have recently been made by the Soudan Government with a view to getting reliable seed and any available details in regard to the cultivation of this fruit, and it is in consequence of these inquiries that the investigation of these samples of soil has been undertaken.

The samples were described as follows:—

No. 1. "Haroas, 50 yards from small graveyard, southward. Top sample from three holes."
No. 2. "Sub-soil of above."
No. 3. "Wortel, Naras, top, three holes."
No. 4. "Sub-soil of above."
Sample No. 1 is a very fine, loose, sandy soil, containing a large proportion of small flakes of mica.
Sample No. 2 is similar to No. 1, but somewhat finer grained.
Sample No. 3 is very similar to No. 1, but coarser grained.
Sample No. 4 is a fine, sandy soil, consisting mostly of small quartz grains, with very little mica.

All these soils are apparently wind blown, and very uniform in grain, the particles being somewhat rounded and mostly just under ½ millimetre in diameter.

The following partial mechanical analyses were made:—

| No. | Pebbles, 3 mm. | Gravel and Coarse Sand, 3 to ½ mm. | Fine Earth, ½ mm. | Nature of Residue on Sieves. |
|---|---|---|---|---|
| | | Per cent. | Per cent. | |
| 1 | Nil | 0·37 | 99·63 | Quartz grains and a fair amount of mica. |
| 2 | Nil | 0·17 | 99·83 | Quartz grains, little mica, and an occasional garnet. |
| 3 | Nil | 0·03 | 99·97 | Mica with a little quartz. |
| 4 | Nil | 0·57 | 99·43 | Quartz grains with a little mica. |

The analyses as to the reserve of plant foods gave the following results:—

*Percentage of Field Sample:—*

| | 1. | 2. | 3. | 4. |
|---|---|---|---|---|
| Fine earth ... ... | 99·63 | 99·83 | 99·97 | 99·43 |

*Percentage of Soil sifted through 1 mm. Sieve:—*

| | 1. | 2. | 3. | 4. |
|---|---|---|---|---|
| Moisture ... ... | 0·54 | 0·73 | 0·48 | 0·16 |
| Loss on ignition ... | 2·30 | 2·51 | 2·32 | 0·67 |
| Chlorine ... ... | ·0753 | ·1516 | ·0341 | ·0114 |
| Soluble salts ... ... | ·152 | .384 | ·112 | ·040 |
| Nitrogen ... ... | trace | trace | trace | trace |

*Percentage of Soil sifted through ½ mm. Sieve :—*

| | 1. | 2. | 3. | 4. |
|---|---|---|---|---|
| Lime ... ... ... | ·550 | ·500 | ·660 | ·316 |
| Magnesia ... ... | ·066 | ·064 | ·126 | .041 |
| Potash ... ... ... | ·575 | ·573 | ·560 | ·079 |
| Phosphoric oxide ... | ·130 | ·139 | ·151 | ·069 |

These soils are of a most unusual type. As regards their physical characters they do not differ much from an ordinary fine-grained, sandy soil—either wind-blown or derived from a river wash—except that the latter usually has an appreciable proportion of clay or fine silt, whereas the samples under investigation may be said to have no very fine material present.

The constituent grains of these soils are, with the exception of No. 4, of a quite unusual type, being mostly particles of mica. This mica is evidently derived from the enormous masses of silvery mica schists which are met with in that part of the country, and probably also, though to a smaller extent, from the crystalline igneous rocks.

With regard to plant food content, these soils are also remarkable. The first thing that strikes one is the extraordinarily high percentage of potash. It is highly probable that this potash is derived from the mica, since there is an absence of the fine material derived from the disintegration of the felspars, which are also potash minerals. There is, of course, considerably more potash in the samples than is indicated by the above figures, since in the methods of analyses adopted only the amount of potash is determined, which is considered as a reserve of available plant food. Since white mica contains about 12 per cent. of potash, it is obvious that in the gradual chemical disintegration of these soils, more and more potash will become available for plants, the ultimate reserve being practically inexhaustible. It is significant that the one sample (No. 4), which contains very little mica and more closely resembles an ordinary drift sand, has also very much less potash than the others, the amount being one-seventh of that contained in the other samples. Since potash is particularly required by plants which contain much sugar, it is extremely probable that the large proportion of this plant food in these soils is a most important factor in the successful cultivation of the Narra fruit.

It is noteworthy, too, that these samples contain a very satisfactory proportion of lime and phosphoric oxide. As is expected in the case of a soil which appears to contain very little organic matter, nitrogen is present only in traces. Apparently, however, the very small amount of nitrogen in the soil is sufficient for the requirements of the Narra bush, though it is quite probable that in the cultivation of this plant an increase in the amount of nitrogen in the soil will will give good results.

The proportion of chlorine and soluble salts is somewhat high in samples Nos. 1 and 2, but their injurious effect on various plants varies considerably. The Narra plant is probably not much affected.

The percentage of moisture is very low, as is to be expected in a loose soil, and the loss on ignition, which, in an ordinary soil, would represent the organic matter is in these cases almost entirely water of constitution. It is evident from the appearance of the samples that the amount of organic matter is negligible.

To sum up, the chemical constitution of these soils differs vastly from that of any other sandy soil that I have seen, and it is of great

importance to realize that the usual desert and dune sand consists of particles of mineral, such as quartz, which contains no plant foods. It is highly probable that the usual type of drifting sand, such as is met with at most localities in the desert belt of the West Coast of South Africa, will be quite unable to support the Narra plant, but since the roots are known to penetrate to a considerable depth, and suitable soil may be met with below the loose sand, this point could only be satisfactorily settled by conducting practical experiments in the cultivation of this valuable plant.

It would be interesting to have analyses made of the soils on which unsuccessful attempts have been made to cultivate the Narra bush.

A further investigation is being made as to the mineral composition of these soils. If any results are obtained which have any bearing on the cultivation of Narra they will be duly communicated.

(Signed) W. VERSFELD, B.A., B.Sc.
Analyst.

# Cape Province Agricultural Association.

## FIRST ANNUAL CONGRESS.

THE First Annual Conference of the newly constituted Cape Agricultural Association was held at Port Elizabeth on the 4th, 5th, and 6th June, under the chairmanship of Mr. W. H. Hockly, the first President of the new organization. About one hundred delegates were present, including representatives of the Albany Agricultural Society, Beaufort West Agricultural Society, Beaufort West Farmers' Association, Breakfast Vlei Farmers' Association, Bedford Farmers' Association, Britstown Agricultural Society, Central Albany Farmers' Association, Caledon Agricultural Society, Colesberg Farmers' Association, Cradock Agricultural Society, Cape Judges' Association, East London Agricultural Society, Gwatye-Bolotwa Farmers' Association, Griqualand West Farmers' Society, Humansdorp Agricultural Society, Ida Farmers' Association, Koonap Farmers' Association, Kingwilliamstown Agricultural Society, Komgha Farmers' and Fruit Growers' Association, Langeberg Farmers' Association, Lower Cathcart Farmers' and Fruit Growers' Association, Molteno Agricultural Society, Midland Farmers' Association, Middelburg Agricultural Society, Naauwpoort Farmers' Association, Northern Districts Agricultural Society, Oudtshoorn Farmers' and Fruit Growers' Association, Paarl Farmers' Association, Port Elizabeth Agricultural Society, Paarl Agricultural Society, Queenstown Agricultural Society, Robertson and Montagu Agricultural Society, Stellenbosch Agricultural Society, Somerset East Farmers' Association and Agricultural Society,

Sterkstroom Farmers' Association, Steynsburg Farmers' Association, Sundays River Farmers' and Fruit Growers' Association, Tarka Farmers' Association, Toekomst Farmers' Association, Uitenhage and Port Elizabeth Farmers' Association, Upper Cathcart Farmers' Association, Upper Alexandria Farmers' Association, Upper Albany Farmers' Association, Vryburg Farmers' Association, Western Province Agricultural Society, Whittlesea Farmers' Association, Worcester Agricultural Society, and Midland Agricultural Society (Graaff-Reinet).

After addresses of welcome had been delivered by the Mayor of Port Elizabeth (Mr. Guthrie), Mr. Mackay (on behalf of the Port Elizabeth Agricultural Society), and Mr. J. C. Fraser (on behalf of the Chamber of Commerce), the proceedings were formally opened by the Secretary for Agriculture, Mr. F. B. Smith.

Mr. Smith said it was a pleasure to him to be invited to attend the launch of the Cape Province Agricultural Association. Briefly sketching the rise of the amalgamation movement, he said it was in no way due to decay of interest in any of the units, nor to diminished scope, nor to insolvency. The old associations had rendered good service in the past in the Cape Province, and every credit was due to them for it, but then they were working on more or less parallel lines; they gradually approximated more nearly to each other and at last decided on marriage—thus the Cape Province Agricultural Association came into existence. Everybody thought amalgamation was the right step. They had closed their ranks and henceforward would speak with one voice. Amalgamation would also lead to economy of money—which was important—and also of men, which was more important. There were not so many men in this country that they could afford to split up and divide into two camps. He congratulated all concerned upon their good sense. Agriculture, he believed, was on the eve of great developments. Great as was the progress already made, the industry was only now gathering strength for a much bigger leap in the near future. It was opportune, therefore, that this organization should come into being just now. As to the work of the new association, he hoped it would not become a mere debating society, but that their discussions would be full and free, and that the authorities would be able to see from their discussions how they arrived at their decisions. He hoped they would deal with details as much as possible, bringing out facts and figures. It was only when they considered details that they found whether the principles concerned were sound. He hoped they would keep in touch with Parliament and Provincial Council by appointing a Parliamentary Committee. In the past these associations had not been in as close touch with Parliament as they could wish; their opinions were not quoted in Parliament as often as they should be. Those societies should have carried more weight than they had done in the past. He hoped one of the first things they would do would be to organize the agricultural industry. Competition was increasing, and the country whose industry was best organized was the country that would succeed best. He pointed out that the United States were sending a commercial Commission, numbering about a hundred, to Europe with a view of investigating how agriculture is organized there; upon the knowledge so gained they would recommend the better organization of the industry in the States. Other countries were fully alive to this. The speaker referred to the valued services of Mr. W. H. Hockly in the interests of Union, and said it was a sincere pleasure and satisfaction to see him in the

chair at this first meeting of the Congress. (Applause.) He regretted Mr. C. G. Lee, for many years the eloquent mouthpiece of the Agricultural Union, was not also present. (Applause.) As to the suggestion that Government had, in the past, made use of the varying opinions expressed by Congress to evade responsibility, he assured them this was not the case. The Department of Agriculture existed simply and solely for the service it was able to render to the farmer and for no other purpose. Finally, he declared the Congress open, and wished it every success.

### THE RESOLUTIONS.

The following are the more important of the resolutions passed in the course of the proceedings of the Congress:—

*Admission of Stock into Rhodesia.*

"That the Union Government be asked to take steps necessary to secure the admission of all classes of stock to Rhodesia from clean areas in the Cape, clean areas being those districts which are not proclaimed as infected areas."

Mr. F. B. Smith said Government had already made representations to the Rhodesian Authorities, and he believed the restrictions were about to be relaxed.

*Movement of Cattle.*

"That the removal of cattle under dipping certificate in other than East Coast fever areas should be abolished, and in lieu thereof all cattle being removed must be practically free from ticks."

*Dipping.*

"That compulsory dipping be proclaimed in all areas where the dipping and cleansing Act is at present in force and extend the Act to the whole coast area where not already in force, and that inspectors be appointed to see the Act carried out; also that Government erect dipping tanks on Government reserves that are let for grazing purposes.

"Congress is of opinion that the principle of simultaneous dipping as now enforced does not attain its purpose of eradicating scab. Congress strongly urges that Government should throughout the year have all infected flocks dipped under supervision, at the same time having the cleansing of infected kraals supervised."

With reference to the foregoing resolution, Mr. Smith said he believed they had now reached a point from which great headway would be made against scab. He controverted the idea that the regulations under the Scab Act were loosely drawn up; they had received great attention in the making, but it was not an easy matter to draw up regulations to apply to the whole of such a big country as this. He mentioned that during the last seven months there had been no less than 2000 cases of prosecution for scab, with fines totalling £5000 or £6000. Quite a number of scab inspectors had been dismissed; some retired, and so forth. There was no finer body of men in the Government service than the scab inspectors. They were anxious to do their duty and clean the disease out. Even the despised north-west were coming into line. At first they were frightened by the prospect, and said they had no water with which to dip. But when a line was drawn round them across which no sheep could pass unless dipped, well, they soon found water—(laughter)—and petitioned the Department to be

included in the simultaneous dipping, and they came under the same regulation. It was impossible to test thoroughly the progress made in the short time during which the regulations had been in force, but the number of infected sheep that had reached Johannesburg market had decreased every month since the present regulations had come into office. (Hear, hear.) If the farmers would help the Government they would then help themselves against scab.

*Valuation of Land.*

"That the Provincial Administration be requested to introduce legislation to amend the Divisional Council Act so that the basis of valuation may be prairie value of the land plus the value of buildings of a permanent nature."

*Destruction of Carnivora.*

"Congress is of opinion that the Union Government should introduce legislation immediately with the object of stringent measures being adopted for the extirpation of stock-destroying carnivora, in which the £1 for £1 principle is to be observed."

"That Congress requests the several associations in this Province to join in organizing certain hunting days for the extermination of vermin."

*Native Matters.*

"That a general pass law applicable to the whole of the Union be introduced."

"That natives, being non-registered voters in areas in which restrictions on the sale of liquor to natives are in force, found in possession of intoxicating liquor be liable to punishment."

*Export of Fruit.*

"In view of the fact that the present differentiation of freights is not sufficient to enforce inspection, the Government be approached with a view to increasing the freight on uninspected fruit or introducing compulsory inspection."

"In view of the fact that some of the ships are delivering the fruit in a riper condition than others, it be suggested that electrical thermometers be carried on all the chambers so as to ensure an equal temperature being kept throughout the voyage."

"That Government be requested to call together the grading committees annually to revise the grades and varieties debarred from inspection."

"That in view of the fact that certain grades are not entirely satisfactory, and that certain varieties are excluded from inspection, and therefore carried at the higher freight, and yet have done well on the London market, a strong committee be appointed to revise the grades and regulations governing the inspection."

"That in view of the fact that many districts are beginning to export fruit, the Government be urged to send round qualified instructors in packing to these districts to ensure the present high standard of packing being maintained."

"That the attention of the Government be drawn to the unsatisfactory way fruit is being handled on the South African Railways; also to the insufficient supply of cold storage trucks and the inefficiency of cold storage at Capetown Docks."

*Fruit Expert.*

"Congress urges upon the Agricultural Department the necessity of a fruit expert for the Eastern and Midland Provinces of the Cape."

*The Mealy Bug.*

"In view of the alarming increase in the spread of the mealy bug, that Government be asked to specially detach one of its experts, Mr. Mally for preference, to study the life history of the pest, with a view to finding some method of eradicating it or keeping it in check."

Mr. Lounsbury (Chief of the Division of Entomology) explained that Mr. Mally was already investigating this question. A little ant was an important factor in spreading the soft scale or mealy bug; it was only a slight factor in spreading the brown scale.

*Damage by Locomotives.*

"That full compensation be paid for any damage done by any locomotive passing over any land."

*Railway Demurrages.*

"In view of the fact that many farmers do not receive their post daily, that Congress is of opinion that the time allowed for the removal of goods from the Government railway stations for those living a distance of over three and less than ten miles might be increased to at least eight days instead of three as at present."

*Railway Crossings.*

"That, in the opinion of Congress, the suggestion of the Administrator of the Cape Province made to certain public bodies that all gates at railway crossings be done away with will, if carried into effect, be a great menace to the travelling public and to farmers' stock in general."

Mr. F. B. Smith observed that the suggestion of the Administrator, if made, was in direct opposition to the policy of the Department of Agriculture, which recommended gates.

*Quarter Evil.*

"That Government be approached with the request to include in schedule of infectious and contagious diseases the disease known as Quarter Evil or Sponsziekte."

*Tuberculosis.*

"This Association is of opinion that more stringent and active measures should be adopted by the Government for the purpose of detecting and stamping out tuberculosis in cattle, and with that view respectfully urge upon Government the necessity of an increased staff of veterinary surgeons."

*Quarantine Stations.*

"Congress is of opinion that the Government should make early provision for the establishment in England, under Union control, of a quarantine and health-testing station for live stock about to be exported to the Union."

*Angora Goat Expert.*

"That Congress urges upon the Government the necessity for the appointment of an Angora goat expert."

*Inspection of Imported Sheep.*

"That owing to the number of inferior sheep imported into this Union from Australia, the Government should allow their experts to inspect any imported stock offered for sale at the request of farmers."

*An Eastern Province Experimental Farm.*

"Congress urges upon the Agricultural Department the necessity of the establishment of an experimental farm with subsidiary experi-

*Agricultural Education.*

"This Congress urges upon the Administrator and the Provincial Council the necessity for more technical agricultural education amongst the poor white children in the country districts, being convinced that the present system of education does not really help to fit those children for their future work in life; and, further, that the country is not getting value for the money now being spent on their education. This Congress therefore suggests:

"(1) That farm schools consisting of boarding establishment and small farms of about 100 acres be established.

"(2) That children of indigent parents only be admitted when over ten years of age and under seventeen.

"(3) That children once admitted be under the control and guardianship of the Administration or Department until they reach the age of twenty-one years.

"(4) That the education curriculum of these schools be strictly confined to reading, writing, and arithmetic, half an hour's tuition in each of these subjects daily, and half an hour to the language which is not the medium of instruction.

"(5) That the balance of the day (making due provisions for recreation, etc.) be spent in practical agriculture, horticulture, and tending of animals.

"(6) That on reaching the age of seventeen the boys be apprenticed out to responsible farmers for four years at fair wages, the wages to be held by the Administration until the end of the apprenticeship and then handed over to the apprentice.

"(7) That these farm schools should be established in suitable parts of the country, and should in no case contain more than forty pupils.

"(8) That we consider the scheme can be so worked as to include both boys and girls.

"(9) That indigent boarding grants should cease in country districts as soon as these farm schools be established.

"(10) That such schools would be self-supporting if credited with the present indigent grants and free scholarships granted by the Education Department.

"(11) That at the distribution of Government land or at any settlement to which the Government had contributed, the applications of children who have certificates from such institutions receive preference."

*Protection.*

"Congress protests against the high protective demands of the Manufacturers' Congress and begs to endorse the finding of the Industries Commission to the effect that 'prohibition or excessive protection would lead to inefficiency and eventual decay,' and we affirm the necessity of the three factors considered essential by the Commission before an industry can be recommended for favourable consideration, viz.:—

"(1) That a fair proportion of the raw material used is or can be obtained in the country.

"(2) That a fair percentage of white labour is employed.

"(3) That there is a reasonable chance of the industry becoming established."

*Branding Act.*

"That the Government be urged to introduce legislation whereby the Transvaal Branding Act shall be made applicable to the whole of the Union."

*Anti-Plumage Bill.*

"That Mr. O. E. G. Evans, who is now in England, be requested to represent the ostrich industry in combating the anti-plumage campaign; that Mr. Evans be instructed by cable. Also that Mr. Chiappini be thanked for the promptitude of his action in taking steps to check the campaign."

*Distribution of Pedigree Stock.*

"This Congress is of opinion that the present method adopted by the Government in the distribution and sale of stud stock is unsatisfactory, and that more attention should be given to the wants of outside districts and the poorer class of farmer; and, further, that Bechuanaland should be provided with a stud stock farm."

*Show Prize Lists.*

"That Congress recommend affiliated societies to secure such uniformity as is possible in similar sections of their prize lists."

*Railway Conveyance of Perishables.*

"That the notice of the Government be brought to the indifferent facilities on the South African Railways for the carriage of cream and perishables and the absence of proper shelter sheds at the various stations for the reception of cream awaiting transit, also the great inconvenience caused to farmers through the over-carriage of their empty cream cans."

*Native Beer.*

"In view of the growing evil of beer drinking in the eastern districts of the Cape Province, with the accompanying stock thefts and other evils, this Congress is strongly of opinion that making, brewing, or obtaining of kaffir beer, whether from grain, prickly pear, honey, syrup, or similar ingredients, should be prohibited by law; and the present permissive Act be made compulsory."

*Miscellaneous Matters.*

"That Government remount officers pay periodical visits to such districts as have suitable horses and mules for sale."

"That the wholesale slaughter of game for the market be curtailed by permitting only owners of farms to send game shot or trapped on their own farm to market."

"That the Fencing Law be so amended that a farmer who fences his farm with vermin-proof fencing shall have the right to claim one half of the cost of such fence from his neighbour, and that this amendment shall only be in force where the majority of farmers make application for it."

"That the regulations in the Railway Tariff Book with reference to the restricted loading of live stock should not apply to stock for show purposes; and that the Railway Department be asked to reconsider same."

"That the Government be earnestly requested to see that all trucks used for the conveyance of live stock are perfectly clean and disinfected."

"That the Government be impressed that in future the wants of all the Provinces be equally considered in the distribution of stud stock."

"That the Union-Castle Company be invited to place thoroughbred poultry on the same basis as stud stock for free transit."

ELECTION OF OFFICE-BEARERS.

Mr. P. W. Michau was elected president for the ensuing year, and Mr. W. H. Hockly first honorary patron; vice-presidents, Messrs. R. H. Struben and Köhler. *Executive*:—Grain Committee: Messrs. J. Starke and C. Gardner. Horticultural Committee: Messrs. Malleson, Cloete, Flannagan, and Roberts. Stock Committee: Messrs. O. E. G. Evans, Jas. Rawbone, Hurndall, Jackson, and E. G. King.

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# Protection from Lightning.

## SOME INSTRUCTIVE CORRESPONDENCE.

MR. C. STEWART, the Chief Meteorologist, has handed us the following correspondence on protective measures against lightning, which we publish as likely to prove instructive to readers interested in this subject:—

I.

A. E. G., Vredefort, Orange Free State, writes:—I notice from the November number of the *Agricultural Journal* that you were good enough to give a reply to an inquiry of Mr. A. McLean, of Volksrust, on lightning; and as my dwelling-house here has been struck twice (at the same corner) within an interval of about twenty years, I would like to have an efficient lightning conductor erected, but as I do not know from whom I could get the necessary material, nor the proper way to go about the matter—letting alone the question of employing a competent man with an adequate knowledge of the first principles for guarding against the danger of a lightning stroke splitting into various directions throughout its course to earth after first contact—I am in a quandary how to proceed. I would, therefore, be glad if you could give me any rules to observe, if I have of a necessity to do the work myself.

My house is a flat-roofed one with brick walls. The house is about 50 feet square, the parapet being about 12 feet high, and has a pointed cone about 16 feet high.

Now, there is a recent comer in this village whose occupation is ostensibly the erection of lightning conductors. He makes out that he has put up some on Government buildings. A workman under his

directions accompanies him, and together they bargain with clients for the price of the job to be done. I approached him on the matter of a conductor for my house, but from a few questions I put to him I was persuaded within myself that I would be entrusting the work to him as one not having even an elementary knowledge of the vagaries lightning can adopt in its passage through a house before taking earth, of which I have experience. He explained that insulation was unnecessary, and that the iron roof of a house being a catchment area of any descending lightning stroke it was sufficient merely to erect a central copper rod with a copper 1 inch tape leading to a copper 18 inches by $\frac{1}{8}$ inch square plate buried a couple of feet on ash or charcoal in the ground. He explains that, copper having above any other metal, the highest attractive power for electricity and the rod being the highest point, contact of lightning would be first with the rod, and the copper tape, by virtue of its better conductive qualities over that of ordinary galvanized iron roofing, would lead the stroke harmlessly to the ground. He does not consider it necessary to have one or more tapes of any metal from the ground plate for leading further away a possible charge. In fixing the copper tape down a brick (earth) wall, Mr. X. uses no insulators, simply nailing the tape fast. Here, again, he explains the superior conductivity of copper will prevent (up to the point of fusion) any electricity leaving its course by a side break into or through the wall. Mr. X. appears to be in entire ignorance of the property of properly constructed conductor to silently discharge electricity from earth and nullify the effect from the clouds which I have somewhere read about.

I shall be glad to have your reply; and, perhaps, you could name me a suitable book of reference for the information I require.

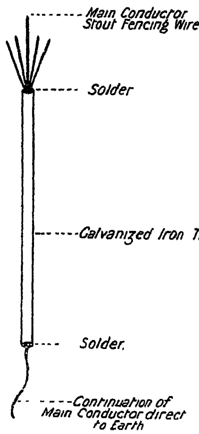
## II.

Mr. Stewart replied:—In this case I should feel inclined to recommend the use of iron tape or galvanized wire rope; but as you might find this difficult to obtain, stout fencing wire might be employed. This would not, of course, be so artistic as the others, and possibly not quite so effective. But I presume you wish a good protection at a minimum of cost and trouble, and this can only be secured by utilizing material readily available. My remarks will, therefore, refer to stout fencing wire.

The upper terminal of the conductor should rise about 2 feet above the cone formed by the roof; stability and efficiency in the silent discharge of electricity being obtained by binding several lengths of wire about 21 inches long round the central one, binding them at the upper ends to form branches at an angle of about thirty degrees with it, and then passing the whole through a galvanized iron tube and soldering securely at both ends. (See sketch.) The tube should then be firmly secured and soldered to the roof and the wire brought straight down the roof to earth, being securely fastened and soldered to the lower end of the roof. Other conspicuous points of the building should be treated in the same manner, and then horizontal conductors should be led along the ridges and eaves and secured and soldered to the main earth lead. The conductors should be secured throughout by staples of the same material as themselves.

The wires should be earthed by attaching to galvanized iron plates—or paraffin tins flattened out might serve the purpose—surrounded by coke or ashes some little distance from the surface of the ground, and at least 9 feet from the foundations of the house. And leads should then pass from these plates to others sunk in permanently moist soil, i.e. below the subterranean water level or sunk in a well. You will understand that the object of this is for the upper plates to disperse the charge when rains have fallen and there is an extensive layer of moist soil near the surface, and for the lower plates to act when the upper are surrounded by dry and practically non-conducting soil.

In setting up the conducters, sharp bends should be avoided. Insulation from the building is unnecessary; in the first place impulsive lightning discharges give the pointed terminals of the conductors no time to act, and may, therefore, strike almost anywhere; and as a galvanized roof might easily be the striking point the conductor attached to it offers a good path to earth; and, secondly, side flashes would almost certainly occur between an insulated wire and the roof, thus rendering it necessary to separately earth the latter. It should be here noted that all guttering and ironwork should be earthed, either directly or by connection with the main leads.




Copper has no advantage over iron as a lightning conductor.

III.

A. E. G. asked for further information on the following points. He says:—(1) Should I solder the tube containing the terminal branched points to the top of the cone formed on the roof, and bring the wire (or tape) down the *slope* of the galvanized roof to its lower slope and thence vertically to earth? For by doing so, a sharp bend —which you later on say should be avoided—would occur just at this lower edge of the cone roof. Or am I to understand that to connect the *roof* (of galvanized iron) per wire to the earth plates is what is necessary?

(2) Is a single wire of the thickness you mention sufficient for the conductor, or should I twist up a couple? That is, is a single wire sufficient to convey a high voltage as from lightning?

(3) Would soft *steel* tape do for conductors? A lot of steel tape, about 1 inch to 1½ inch by 1-16th inch, as the binding round bales of grain bags comes to Vredefort, and I can get any quantity of this material for next to nothing.

(4) I have a well of permanent water (for domestic use) about 30 feet away from the house. If I were to interconnect up the several earthed wires (or tapes) and sink the lower terminal into this well of water, would it still be necessary to have earth plates?

I enclose a newspaper cutting giving a plan of the cage system, which I understand insulates a building. Am I correct or wrong? I would like to have your opinion, as from your letter I understand that, presupposing a brick building with galvanized roof to be struck, the idea is partly to intercept but objectively to conduct a flash harmlessly to earth.

IV.

Mr. Stewart replied:—The intention is for the wire to be brought direct from the upper terminal to the earth, and as it should be well secured to the roof and soldered at the points of first and last contact both terminal and roof are earthed at the same time. At the point where the wire leaves the roof it should be looped a little and not suddenly bent, observing the rule that the length of conductor between any two given points should not be more than half as far again as the shortest distance between them.

It is presumed that you will have several leads to earth, and I think single stout wire might be relied upon to carry off any ordinary lightning discharges.

In the circumstances mentioned you could avoid the use of earth plates by making a coil of the earth terminals. The idea is to obtain a sufficiently extensive surface for the dispersion of the electricity, and it matters not whether this is obtained by plates or the conductors themselves.

I wish you had sent me a sample of the soft steel tape you refer to, as I do not feel quite sure as to the accuracy of the measurements given. If it is actually 1-16th inch in thickness I think it would be suitable, although I would not, in the absence of any experience of the particular material, make any definite recommendation on its use.

I return the newspaper cutting which you kindly sent me. An iron cage without any metal leading into it would be a perfectly safe place in a thunderstorm, and galvanized iron roofs are of great assistance in the construction of such cages as the conditions of existence render practicable.

V.

J. G. G., Ottoshoop, writes:—This farm is somewhat subject to lightning, and I have had fatalities in the past, notably three horses killed in stable two years ago. This year I have done a considerable amount of fencing, and have had the following fatalities:—8th December, 2 oxen killed close to the wire; 20th January, 1 cow killed in veld; 6th February, 3 ewes killed under wire; 9th February, 1 calf killed just by wire. With the exception of the cow killed on 20th January, all were close to the wire. Is this coincidence? The fencing is composed of five barbed wires and hardwood posts ten yards apart.

Is there anything I can do by putting wires into the ground from the fence? The total length of fencing is over thirty miles.

VI.

Mr. Stewart replied:—It was most probably not coincidence that the cattle were killed in the vicinity of the fencing. I should recommend the earthing of the wires at, say, each straining post, any joins in the wires between the earths being well made and soldered. Each earthing might be effected by firmly attaching and soldering a length of wire to a galvanized iron plate 3 feet by 3 feet by $\frac{1}{8}$ inch, buried in ashes in permanently moist soil. It should be well attached and soldered to this, and also to the other wires passed. This form of earth might be too expensive to realize, and paraffin tins flattened out might be substituted for the plates, and you might content yourself

with burying to such a depth that they lie in moist soil during the rainy season.

Your losses through lightning in the past will form a good basis in which to judge the efficiency of a system of protection, and I hope you will keep me fully advised of the results.

# Rural Notes.

### "Production of Bright Tobacco."

By some unfortunate oversight an error crept into the description of the plans of the flue-curing barn illustrated on pages 889 and 890 of the last issue of the *Journal* in connection with Mr. H. W. Taylor's article on the "Production of Bright Tobacco." This barn was wrongly described as a corrugated iron barn, whereas it should have been described as a brick flue-curing barn. The figure on page 891, too, should have been described as a wagon frame for hauling green tobacco from the field to the barn.

### The Royal Show at Maritzburg.

The Royal Agricultural Society of Natal held its fifty-eighth annual exhibition at Maritzburg during the closing days of June, commencing on the 25th. Although the weather was rather threatening the day before the opening and there was a slight fall of rain during the night, the opening day of the show was heralded with glorious weather, which continued throughout the exhibition. The show was a great success, the total entries numbering 4821, which constituted an increase of about 1100 on the previous year's total. The function was officially opened by his Excellency the Governor-General, Lord Gladstone, who in the course of his address, said: "This show is the fifth important show that I have been to in the course of a few months, and nothing strikes me as being more hopeful for the future of South Africa than the quality of these shows, very often under great difficulties. While we hope the worst of the East Coast fever has gone never to return, yet almost all through South Africa we have suffered from a very trying and severe drought, and when I went to the first of these shows, I certainly expected to find unmistakable signs of that drought. I expected to find a falling off in the produce, the cereals, the fruit. Not a bit of it! In spite of the drought, wherever I went there seemed to be record shows, and if there was some falling off in the quantity there was everywhere better quality—(cheers)—and in fruit especially there was a great improvement. I sincerely congratulate the farmers of South Africa, as well as the farmers of Natal, on the success with

which they have attained through putting their shoulders to the wheel, through not losing heart, and through drawing on their own resources, energy, and enterprise to meet these undoubtedly great difficulties.

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"When I was here two years ago I said that I thought there were perhaps too many agricultural shows in South Africa. Now I am not sure that I was right. (Cheers.) I think still that they can be overdone and that you may have them too thickly here and there, but what I have seen throughout the Union is this, that on the whole the more opportunity the farmers have for showing what they can do the better, even if it is only a show of the second or third degree. The farmers are encouraged to do more when they go to the various shows. In some parts of South Africa I am afraid it is true that if they do not go to the smaller shows they do not go to any shows at all, although I believe that here in Natal the farmers are more free from that reproach than elsewhere. I know that in some parts of the Free State there are thousands of farmers who do not go to the big shows at all. What is the result of that? The result is that the farmers do not learn, they do not see what others are doing, and they do not realize what they could do if they tried. They go on muddling away on the old lines and judging of their success and progress by the number of the stock they possess, never remembering that it costs as much to keep a bad beast as a good one. At shows they learn what can be done, and they imitate the more progressive farmers, so that on the whole I am glad the practice of holding agricultural shows is as widespread as it is. As I say, they may be overdone on occasion, but here I have made my confession of the error of two years ago, and this is my atonement. (Cheers.) You farmers have something to work for. You are producing stuff which is necessary for South Africa and which the world is wanting in increasing degree. You have not yet produced enough even for your own wants, and you have before you the ever-increasing needs of the world, needs in which the standard of requirement is ever rising. People are ready to give better prices for what they want. All you want is organization, more capital, and more railways. You also want more population. (Cheers.) Population I hope will come whatever nationality it is, provided the man or woman is an adequate person for the needs of South Africa. I do not want to keep people out of South Africa who can do good here. We want population here, because without it we cannot get capital, and without capital we cannot get the railways, the breeding establishments, the irrigation, the organization, the co-operation, and the insurance for the farmers that we need. All these things mean money, and to get them we must first get capital. Therefore population is a thing to preach in every corner of South Africa."

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The great feature of the show was the cattle section, the excellence of which was particularly notable in view of the existing East Coast fever restrictions. Particular mention must be made of the Friesland, Shorthorn, and Devon classes, which included some fine animals. In the class for Friesland cows, three years or over, keen competition was provided by the twenty-five entries; the first prize went to "Kempshott Wiegertje," a black-and-white cow belonging to Mr. Fred. Harris, of Maritzburg. Mr. Edward Downing's latest importation, Clintonia Fan, a four-year-old Friesland, secured premier honours in

the open milking competition. Messrs. Moe Bros., of New Hanover, secured the first prize in the class of Friesland bulls, three years or over; and in the class for under three years the estate of the late P. Otto, of Ottos Bluff, took first with Clothilde Copia King. In the Shorthorn classes the bull, Barrington, belonging to Mr. P. D. Simmons, of Mooi River, took the first prize. This is a magnificent bull, which for size and quality stood out from all the rest. Messrs. Heenan Bros.' bull, Victor G. Ross, also a splendid animal, which won a championship last year, was second. Among the two-year-old Shorthorn bulls there was also very keen competition, in which Mr. Orlando Hosking, of Rosetta, came to the fore with his dark red bull, Duke of Albany. In the class for Shorthorn cows, Mr. P. D. Simmons secured first prize with his imported cow, Lady Grey. In the Devon bull class, Colonel Greene's pure-bred Golden Sift was first; the second award falling to an animal belonging to Mr. T. W. J. Hall, of Mooi River. Colonel Greene also obtained first in the Devon cow class with his Ruby; the second prize, too, fell to him. Mr. P. D. Simmons was fortunate enough in securing the challenge trophy, value £150, offered for the best family group of cattle of any distinct breed; while the Breeders' Cup, value 30 guineas, and the Society's gold medal, for the best family group of Shorthorns bred in the Union, went to Mr. Orlando Hosking, of Rosetta. The Breeders' Cup, value 30 guineas, for the best South Devon family group bred in the Union, was won by Mr. T. W. J. Hall, of Mooi River; and the similar trophy for the best group of Frieslands was won by Mr. Edward Downing.

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The horse section, too, showed up well, and competition was very keen. Thoroughbreds were a strong class as regards both quality and numbers. In the class for stallions, three years or over, Messrs. Anderson Bros.' Chesney was first, Wilkins Micawber (of the Government Stud Farm at Tweespruit) being placed second. Premier honours in the class for thoroughbred stallions bred in South Africa fell to De Mist, from the Government Experimental Farm at Cedara. In the class for mares of the same breed, imported or otherwise, Mr. Arthur Forbes, of Choombie, Cape Province, took first with his Savonia. Mr. Forbes likewise did well in the Hackney section, where his stallion, Heacham Ripper, headed the list of honours, being adjudged the best Hackney stallion on the show, and receiving first prize in the class for Hackney stallions, three years or over, whilst he also received premier award in the class for single carriage horses, 15 hands or over. Mr. Forbes, it may be added, entered no less than fourteen Hackneys at this show. In the class for Hackney mares, three years or over, imported or otherwise, Mr. W. A. Bester, Wesselina, Orange Free State, secured first prize with his beautiful mare, Lady Gongelt; while Mr. Arthur Forbes took second with B.B. Sweetmeat, also a splendid animal. The floating trophy, value 50 guineas, for the best family group of thoroughbreds, went to Mr. G. W. Nourse, Zandspruit Station, Transvaal. The exhibition of sheep and goats showed a noteworthy improvement upon last year. Whilst Natal farmers were well represented, however, Messrs. A. and V. Robertson, of Amersfoort, Transvaal, swept the board, as well as winning the cup, value £25, awarded for the most points obtained in the sheep section. The special prize for the most points in the Merino classes was secured by Messrs. W. E. Clarke & Co., Mooi River, Natal. The show of

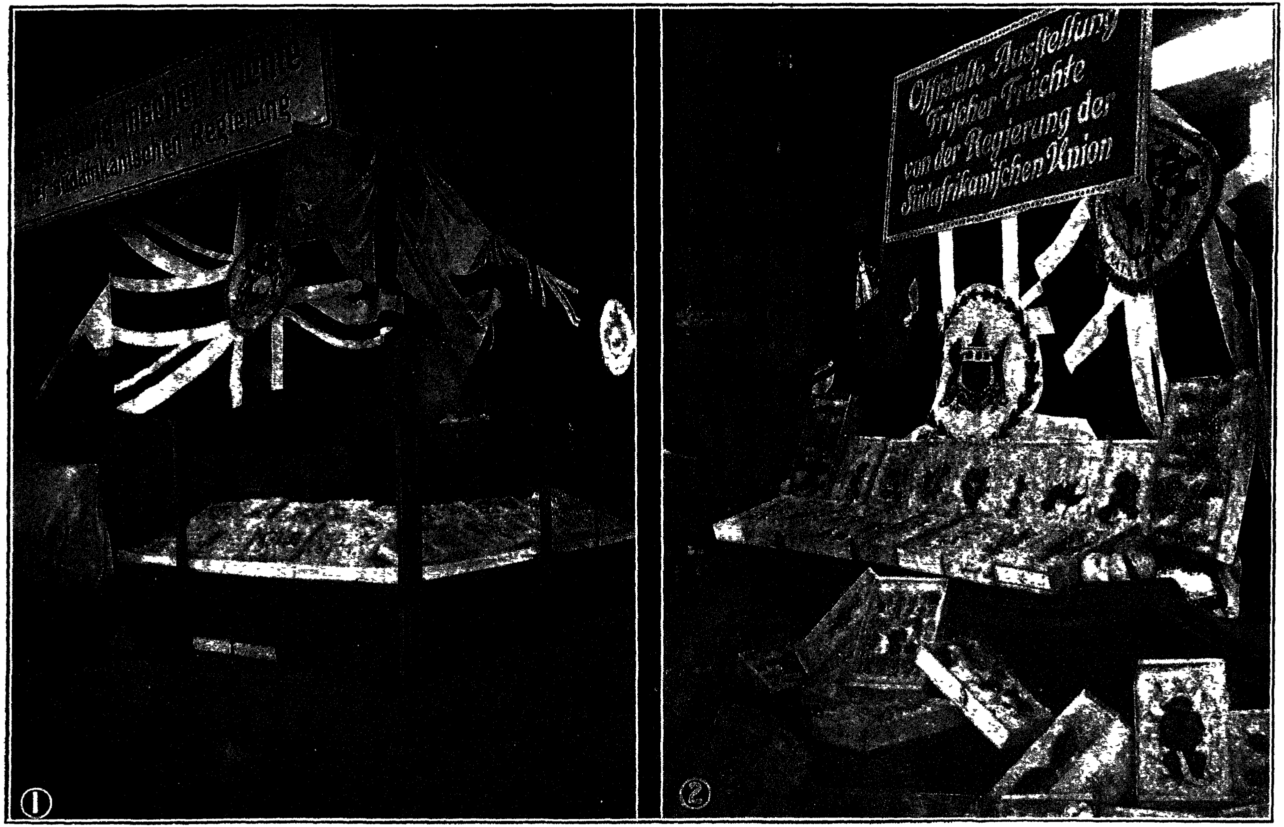
goats was not great, although Mr. J. F. Maeder, of Harrismith, exhibited some pretty Angoras, and secured most of the prizes.

As regards the produce section, special mention must be made of the excellence of the maize exhibits. Mr. W. B. Bosse, Leigh Hurst, Richmond, secured the first prize for the best bag of Hickory King. The first prize for the best ten cobs of Hickory King went to an ex-student of the Cedara School of Agriculture, Mr. E. O. Mapstone. There were also excellent exhibits of Natal Horsetooth and Mercer, and it was noteworthy that keen competition in this latter variety—the home of which is Natal—was offered by extra-Natal growers. The other varieties of white and yellow maize were all well represented. There were also some excellent exhibits of fodder and teff grass. The other sections—poultry, dairy produce, fruit, etc.—all showed an advance upon last year, although there is still much room for improvement. Attention may be here drawn to the unsatisfactory arrangements adopted this year in the stalling of the dairy exhibits. These were placed in close proximity to fruit and leather ware, the natural odours arising from which are easily absorbed by such a sensitive product as butter. It is to be hoped that this point will not be lost sight of next year. The room available for the citrus and other fruit exhibits, too, was unduly limited—so much so, indeed, that judging, especially in the case of oranges packed for export, was rendered an awkward and difficult task. A curious circumstance was the absence of Natal entries for tobacco and cigars, all the prizes being secured by a Johannesburg firm. This is the more astonishing as in Natal tobacco is grown on a considerable scale, and there are numerous cigar and cheroot factories. The show on the whole was an excellent one, and the Society may be congratulated upon the success which it has once more achieved.

**Advertising our Fruit.**

During the months of February and March the Trades Commissioner in London arranged a series of small exhibitions of South African fruit in Paris, Hamburg, and Berlin, with the object of making South African fruit better known on the Continental markets. It was not possible to arrange for an exhibit of fruit in the Market Hall in Paris, as the regulations prevented it, but arrangements were made with the leading fruiterers to exhibit, each week consecutively, in one of their shops, during which the whole of the window was devoted to Cape fruit, and was specially decorated for the purpose. A suitable notice was also displayed stating that the fruit was exhibited by the Union Government of South Africa. In Hamburg and Berlin arrangements were made for a continuous exhibit in the market hall, for which purpose a stand was engaged and an attendant put in charge, the object being to make the fruit dealers acquainted with South African fruit. These stands were decorated with the Union flags, and a large notice board announced that it was an official exhibition of fresh fruit shown by the Government of South Africa. At the same time a beautiful display was made in the window of the leading fruiterers in Hamburg, Messrs. Heinerdinger, who placed their window at the disposal of the Government throughout the period of the exhibitions. The photographs which we publish herewith

*Plate No. VIII.*




ADVERTISING OUR FRUIT.

1. Stall in the Market Hall, Berlin.

2. In the Hamburg Market Hall.

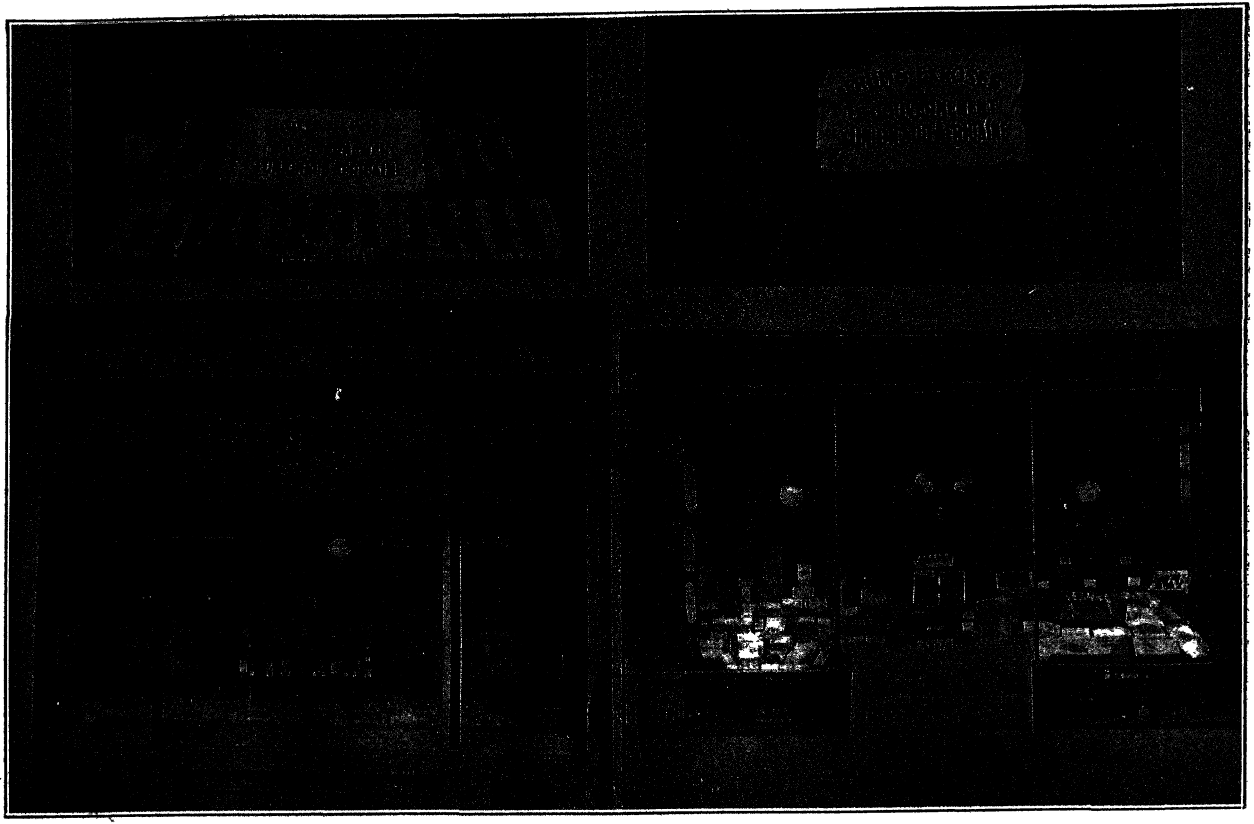


*Plate No. IX.*

ADVERTISING OUR FRUIT.

1. A Paris Exhibit (in the shop of M. L. Fontaine). 2. Another Exhibit in Paris (in the window of M. Charton). 3. The Union Government's Shop in London. 4. A Hamburg Exhibit (Heinerdinger).

give an idea of what a fine display of South African fruit was made. A most beautiful display was that put up by Messrs. Wertheims in Berlin. This firm's shop is one of the largest in the world, and is visited by tens of thousands of people daily. This exhibit attracted large crowds each day; indeed, the whole of the exhibits created considerable interest in Hamburg, Paris, and Berlin, and the Trades Commissioner reports that numerous inquiries resulted.

SHEEP-SHEARING BY MACHINERY AT THE PRETORIA SHOW.

**The Anti-Plumage Bill.**

Mr. James Buckland writes from the Royal Colonial Institute, London:—The assertion that there is a tendency in England to extend the anti-plumage campaign to ostrich feathers owing to the alleged cruelty involved in their collection is nothing but a malicious attempt on the part of the opponents of the Plumage Bill to bring disfavour upon that measure. The anti-plumage campaign is centred in this Bill, and, as I was the promoter of it, I may claim to be heard on this question. Not only are ostrich feathers exempt from the provisions of the Bill, but in "Pros and Cons of the Plumage Bill," which I wrote three years ago and which pamphlet has been widely circulated

throughout the world, I made the following statement: "If aigrettes and the plumes of the bird of paradise were prohibited, the loss to the trade would be counterbalanced by the use of ostrich feathers. As it is, the use of the latter in preference to the former as a hat decoration is daily finding favour in the eyes of the women of this country. It is gratifying to notice that the value of the imports of ostrich feathers in 1909 from the Cape alone shows an increase over that of the preceding year of £292,159." This does not look like a desire on my part to exclude ostrich feathers from the London market. With regard to the allegations of cruelty, it has been my practice at every lecture on the Plumage Bill given since I obtained the photographs, now more than two years ago, to exhibit a series of lantern-slides showing the whole process of clipping the feathers of the ostrich for the millinery market. In addition to this ocular demonstration of the absence of pain to the bird, I have by verbal exposition made it perfectly clear that no suggestion of cruelty could be brought against the operations of the great and growing industry in South Africa of which every Briton should be proud. It is perhaps unnecessary to mention that thousands of people throughout England have seen these photographs and heard my remarks thereon. The opponents of the Plumage Bill must be hard put to it for weapons of offence when they can adduce no weightier instrument than falsehood.

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**A Fine Lot of Shropshires.**

The Vereeniging Estates, Ltd., have imported from Great Britain a very fine selection of Shropshire sheep chosen with special care as to quality and density of wool, namely, sixty shearling ewes and one shearling ram. Mr. Tanner's famous flock was represented by eighteen beautiful ewes sired by Lord Liverpool (13672), winner of first prize at the R.A.S.E. Show, and bred by Sir Richard Cooper, Bart., from whom Mr. Tanner purchased him at 200 guineas; Bob's Choice (13356), by Cavendish (12554), dam by Best Man (11374), winner of first at the R.A.S.E.; Hardwicke Branch (13852), a winner at the R.A.S.E., bred by Mr. Bibby, of Hardwicke; Royal Gloucester (13852), the winner of first at the R.A.S.E. and Shropshire and West Midland; Shraden Sampson (13939), by Farmers' Sensation (13412), his grand-dam being sired by Lord Cardiff, winner of first at the R.A.S.E., and sold at 400 guineas to Tasmania. Mr. Milne's prize-winning flock supplied twelve ewes sired by Palatine Champion, winner of first at the Shropshire and West Midland Show; Montford Choice (13216), bred by Mr. T. S. Minton, by Montford Longitude (11173), dam by the Royal winner, Sherlowe Lad (11270), and Beam House Dye (13786), by R.A. (13498), dam by Lord Swindon (12647). From Mr. R. C. Pryce's carefully bred and old-established flock were selected sixteen very smart ewes sired by Holker Champion (13181), winner of first prize at the Royal, bred by Lord R. Cavendish, by Holker Royalist (12054), grand-dam by P.D.R. (10478), which was sold for 150 guineas, and thence to Downton Emblem (7423), winner of first prize at the Royal, and sold for 100 guineas; and Trysull Royalist (12754), bred by Mr. H. Mander, by Holker Royalist (12054), by Phenomenon, a Royal first prize winner, and thence to Fair Star (5177), whose thirty-two sons in 1893 averaged £42. 3s. The balance

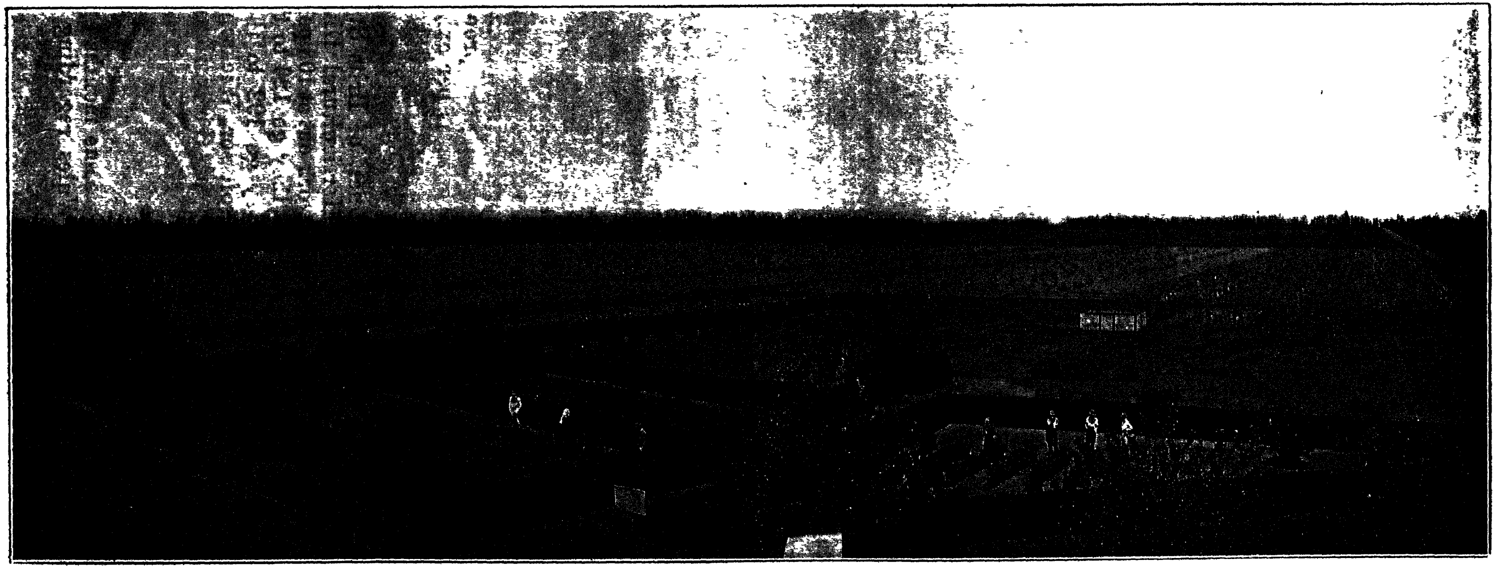


*Plate No. X.*

SCHOOL OF AGRICULTURE AND EXPERIMENTAL STATION, POTCHEFSTROOM.

Showing Forest Nursery, Botanical Demonstration Plots, Wheat Fields, including areas grown for seed purposes, experimental and breeding plots.

of fourteen ewes are a very typical lot, bred by Messrs. Sale & Son, who hold the record for prizes won during the last four years with wool against all short wools at the R.A.S.E. shows. These ewes were sired by Montford Tarriff (13473), bred by Mr. T. S. Minton, by Heredity (12613), from a ewe by Montford Longitude (11173) and Bentley Marksman (13585), by the successful sire Bentley Cavendish (13091). Mr. Bibby's celebrated flock is represented by a typical well-grown son of Hardwicke (13851), bred by Mr. C. Coxon, by Elford Lowe Doctor (13144), dam by Shrawardine Noble (13273), and grand-dam by Hardwicke Fortification (12349). This choice selection of stud animals will form the nucleus of a first-class flock of Shropshires.

**Trophy for Cured Bacon.**

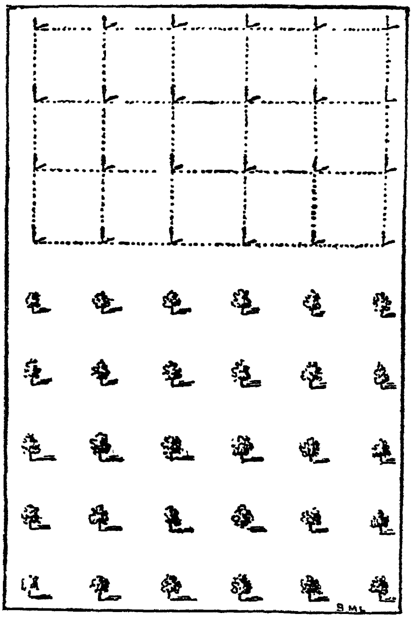
The Council of the British Dairy Farmers' Association has decided to create a special class at the next dairy show, to be held in the Royal Agricultural Hall, London, on 21st to 24th October, for bacon cured anywhere throughout the British Empire. There are at present a number of classes for bacon and hams at the British Dairy Show, but hitherto the exhibits in these have been confined to the United Kingdom. The great progress, however, which has taken place in the British Dominions and overseas has been brought to the notice of the Council of the British Dairy Farmers' Association, and they have come to the conclusion that the time is opportune for the creation of the class referred to. It is proposed that a British Empire Trophy should be offered for competition at the next dairy show to be held on 21st to 24th October, 1913, and that the class should be open to bacon curers in the United Kingdom, the British Colonies, British Protectorates, and the British Empire. The exhibits must consist of two sides of bacon smoked and two sides of bacon pale dried. The weights admissible for this competition will be not less than 56 lb. per side, and not more than 68 lb. per side. The curing must be done on the exhibitor's own premises, but the drying and smoking may be done in the United Kingdom under a certificate from a duly accredited representative of the Governments concerned. The trophy referred to will take the form of a cup, value fifteen guineas, as first prize; cup, value five guineas, second prize; and another value two guineas, third prize, as well as other awards. It is proposed that the entry money for the class should be two guineas per exhibit.

**Systems of Treeplanting.**

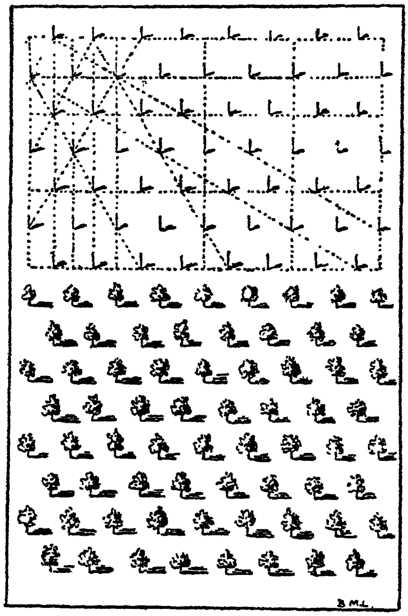
In reply to an inquiry by Mr. Jonnes, of Brits Station, Transvaal, Mr. R. A. Davis, Chief of the Horticultural Division, writes that trees planted 20 feet apart in squares work out at 108 per acre; when they are planted in hexagonal or sextuple they go 126 to the acre; and when they are planted in quincunx they go 192 to the acre. The accompanying diagram, taken from Professor Wickson's celebrated work, will make clear the differences of the various systems of planting.

**More about the Guada Bean.**

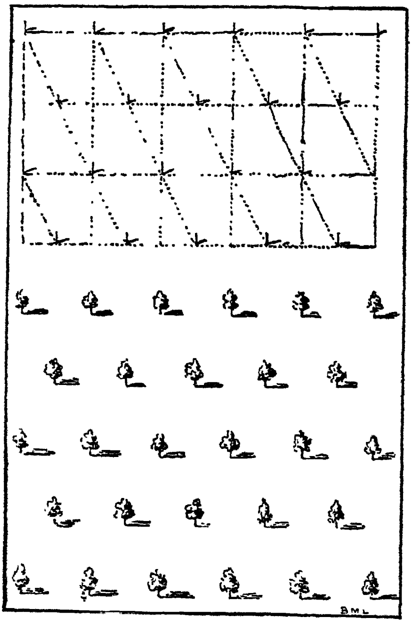
Since the publication in these pages some months ago of a letter from a correspondent in New South Wales regarding the Solomon



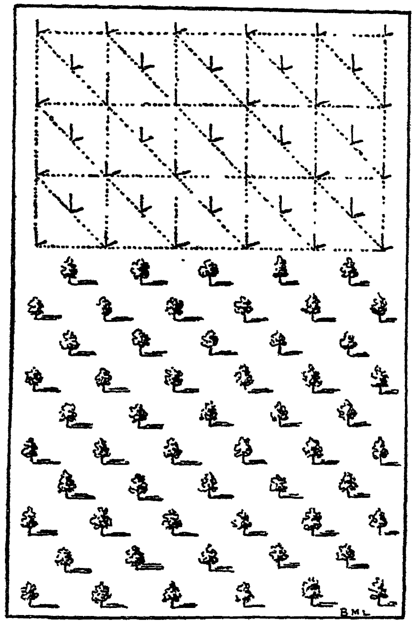
TREES PLANTED ON THE SQUARE SYSTEM.



THE TRIANGULAR OR ALTERNATE SYSTEM.



THE HEXAGONAL OR SEXTUPLE SYSTEM.



THE QUINCUNX SYSTEM.

Island "Guada" bean (*Trichosanthes anguinea*), we have received a considerable number of inquiries for further particulars. The plant appears to be quite unknown in this country, and we are therefore glad to be able to publish some further information regarding it taken from an article by Mr. Howard Newport, Instructor in Tropical Agriculture, Cairns, Queensland, in the April number of the *Queensland Agricultural Journal*. Mr. Newport says: "This is really not a bean, but a gourd, though one that does not dry with a hard shell. In fact, it has been very aptly likened to a hollow cucumber. Like most gourds the plant is quick growing, and the flowers and leaves are typical of the genus. The fruit grows to a considerable length, though not often more than 4 to 5 feet. Specimens 7 feet long would be exceptional. When ripe the end of the fruit commences to change colour, often to a red, and if the weather be wet, will rot away, allowing the seeds, which by this time have generally fallen to the bottom of the tube-like fruit, to fall out. The seeds are irregular in shape, and were not found, in North Queensland, to be of long vitality. This is contrary to the habit of most of the gourd family. For table use the gourd may be cut at any time previous to that of its changing colour, and even after this sign of over-ripeness is apparent the upper portion may be used for culinary purposes, for the stringiness or toughness usual in most gourds is absent in this species. When young the fruit is slightly hairy or rough, and if scratched or scraped has a very distinctive and rather disagreeable scent. This smell will disappear, but, before cooking, it is well to scrape the bean. When cut into lengths of 3 to 6 inches and then stripped into numerous slices of about 4 inches wide, it is very much like a particularly fine dish of French beans both in appearance and flavour. It retains its vivid green colour better than most beans do when cooked. The bean, being hollow, appears to contain more food substance than it really does. A bean of 5 to 6 feet, weighing 2 lb., would be a very well-grown one; the average weight of average beans would be but little over 1 lb., which would be again reduced when cooked, so that a 3-foot, or even a 6-foot, bean would not go very far in satisfying hungry people."

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**Soy Beans.**

The Trades Commissioner in London has received the following note from the Secretary of the Seed Oil and Cake Trade Association of Liverpool: Substantially, all the beans treated in Germany are relieved of their oil by the extraction system, which gives better results than the crushing method. The nature of soy beans is such that, under pressure, the cake adheres to the press cloth, and these, in turn, to the press boxes, so that the ordinary crushing process is a very slow one. One Hamburg manufacturer found by experience that he could make 110 pressings of cotton seed in the same time as it took to make 80 pressings of soy beans. While linseed prices ranged abnormally high, quite a number of German manufacturers began to crush beans, the oil of which they readily disposed of as a substitute for linseed oil. This business proved to be profitable, although the manufacturers concerned were not specially prepared for handling this raw material. It now seems that mills in which it is proposed to handle soy beans regularly are doing so according to the extraction process, using 0.77 gasoline as a solvent. There are numerous methods of applying

the solvent, but the differences are in respect of the details, and the main principles are generally known in manufacturing circles on both sides of the Atlantic. One of the interesting peculiarities of the extraction of soy oil through solvents is that the residue is superior to cakes obtained through pressing. This residue, known in Germany as "schrot," is without the odour of gasoline, and is said to be quite free from laxative substances. Normally, the beans act as a laxative when fed to cattle in the form of pressed cake, and the great objection to the old-fashioned type of soy-bean cakes was their laxative properties. The elimination of these qualities through the solvent process is highly important. However, under any circumstances, soy-bean meal must be fed with care and in combination with other feeds. Mr. H. Oberheu, of Magdeburg, is endeavouring to establish a company to be called the Deutsche Soja-Pflanzungsgesellschaft, with a capital of 1,000,000 marks in 1000 shares, for the purpose of cultivating the soy bean in Germany on a large scale, his field experiments having demonstrated that the climate is suitable and that the beans yield 15.4 per cent. of oil. The value of soy bean oil is, say, £24 per ton. The South African average oil content in soy beans is 20 per cent., so that the money value of oil quantity expressed from one ton of South African soy beans is worth £8 per ton more than the German, and, possibly, Manchurian.

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**Tropical Disease-resistant Cattle.**

Endeavours are being made in America to obtain a new breed of cattle, the result of a cross between the Indian Zebu breed and the Hereford, with a view to combining with the beef characters of the latter the disease and tick resistant qualities of the former. According to the *American Breeders' Magazine*, the breeding tests, although of a preliminary nature, have been carried out along Mendelian lines, and it has been found that the peculiar horns, dewlap and sheath, drooping ears, large hump, and colour of the Zebu are probably unit characters. It is believed that some of the size and bulk characters blend permanently and that a mixed hybrid might be created that would breed very closely true to some new type which would combine the tick, insect, and tropical disease resistant character of *Bos indicus* (Zebu) with some of the desirable beef or milk characters of *Bos taurus* (European breeds). Complete segregation occurred in the second generation. That is, Hereford animals were bred from crossing hybrids of the first generation. An experiment is now in progress to see if these apparently pure Herefords have taken up a factor from the Zebu (from which they have partly originated) that will render them resistant to disease and ticks, without interfering with the excellent beef characters for which the Hereford breed is renowned. These are experiments that will be followed with interest by South African farmers, and we will make it our business to keep our readers acquainted with the progress of the investigations as details of the results come to hand.

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**Fire-damaged Sugar-cane.**

The burning of cane, either by accident or design, has become so common in certain districts in Queensland that it was resolved at a recent conference of the Australian Sugar Producers' Association, at

Brisbane, to ask the Council to deal in an adequate and prompt manner with the whole matter at their next meeting. The *Agricultural News*, in a note on the subject, states that recent analysis has shown that losses from burning occur to the following extent. In the first place there is a loss in weight which is never less than 4 per cent., and on the average probably as high as 6 or 7 per cent. Accompanying this there is an increase in the percentage of fibre which leads to corresponding difficulties as regards extraction. Moreover, the deterioration in the field is more rapid in the case of burnt canes than in the case of green canes cut and left in the same way. Furthermore, an average interval of three days between burning and milling causes a minimum average reduction in value of 20 per cent. In one experiment, during ten days the following changes were found to have taken place. On the day of burning the analysis was: Brix, 24.19; sucrose, 22.36; quotient of purity, 92.43: glucose, 41; glucose ratio, 1.83; percentage sucrose in cane, 17.92. On the tenth day, analysis gave the following result: Brix, 20.59; sucrose, 14.95; quotient of purity, 72.61; glucose, 4.17; glucose ratio, 27.89; percentage sucrose in cane, 10.07. It is stated further that practical experience supports the above figures, since on several estates it is taking from ten to twelve tons of burnt cane to make a ton of sugar, whereas of green cane only seven tons are required.

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**Value of Liquid Manure**

Stable or farmyard manure is not used to any considerable extent by farmers in this country, but for those with whom circumstances permit of its use it will be instructive to note the results of an experiment that has been made in Ireland by the County Down Committee of Agriculture. The idea of this experiment was to bring under the notice of farmers, in as striking a manner as possible, the huge loss they annually incur by allowing the liquid manure to be lost. In this experiment 16 tons of liquid manure were tested against 16 tons of farmyard manure, and against a mixture of 1 cwt. of nitrate of soda, 2 cwt. superphosphate, 2 cwt. kainit per statute acre. This mixture of artificials was used because it was proved to be a very reliable one by previous experiments. In 1912 two tests were conducted with the following results:—

| Manures. | Average Yield. tons. | cwt. | qrs. |
|---|---|---|---|
| Liquid manure, 16 tons ... ... ... | 3 | 18 | 2 |
| Farmyard manure, 16 tons ... ... | 2 | 12 | 3 |
| Artificial manure ... ... ... ... ... | 2 | 12 | 0 |
| No manure ... ... ... ... ... ... ... | 1 | 16 | 2 |

In one test the liquid manure gave the enormous yield of 4 tons 5 cwt. of Italian ryegrass hay per statute acre. Even this did not show the full value of the manure, because quite as great a difference was discernable in the after-grass.

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**Feeding Cabbage to Dairy Cows.**

The value of the cabbage as a feed for dairy cows is fairly generally known; it is a succulent feed, is highly relished by cows, is an excellent milk producer, and is rich in protein. But whilst its

value is realized, many dairy farmers have a rooted objection to it on account of its liability to impart an undesirable flavour to milk and butter. This question is dealt with by a writer in a recent issue of *Hoard's Dairyman*. After observing that the only objection to feeding cabbage to milch cows is the flavour imparted to the milk, he proceeds to point out that, when fed under certain conditions, this objectionable feature can be avoided. One of the first precautions to observe, he tells us, is to keep the cabbage away from the stable at milking time. Milk absorbs odours quickly, and if cabbage odours are near the milk it will be tainted. Another precaution to observe is not to feed the cows just before milking time; any highly flavoured feed, in fact—turnips, for example—an hour or two before milking will impart a taint to the milk. Cows should be given cabbage in the field, at least several hours before milking time. Where cabbage is used as a soiled crop it should be fed in rather limited quantities, beginning with but a small ration which may be gradually increased. One bushel at a feed can be given safely when cabbage is fed twice a day. For young stock, of course, the precautions in regard to feeding cabbage to milk stock do not apply; it is an excellent feed for them and should be taken full advantage of. Thorough aeration and cooling of the milk immediately after milking will help to remove, not only the cabbage odours, but also all other taints to which milk is subject. The milk should not be left standing in pails or cans, but should be removed to the farm at once.

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**"The S.A. Poultry Magazine."**

We are glad to note the progress which the *South African Poultry Magazine* is making, and the sound work it is performing in the interests of what is one of our most neglected farm industries. Yet neglected as the poultry industry is by our farmers, it is at least gratifying to see that South African poultry interests are already sufficiently extensive to support a good, sound journal as the one before us—which, we may observe, is well into its second volume. The fault with many of our new ventures in agricultural journalism is that too much reliance is placed upon oversea exchanges for the supply of "copy," and too little attention is given to local conditions and to the requirements of this country. So far as we can see, the editor of our poultry contemporary has not permitted himself to be overcome by the seductions of the exchange system; and the result is that his journal is attracting good articles by local men and valuable correspondence from an ever-increasing circle of readers. In the interests of the poultry industry in this country, it is to be hoped that the *South African Poultry Magazine* has come to stay, and that its sphere of utility will steadily grow. For the benefit of those interested we may mention that the address of the magazine is P.O. Box 5555, Johannesburg, and that the annual subscription, post free within the Union of South Africa, is 6s. 6d. Specimen copies are supplied gratis on application.

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**Miscellaneous Notes.**

Notice is given that the clinique for sick animals at the Veterinary Laboratory, Grahamstown, has been discontinued.

Messrs. Reynolds Bros., Vaal Station, Transvaal, are starting a herd of Herefords, and have bought some promising young bulls in England from Messrs. J. P. Prosser and Newman Bros.

*Plate No. X.*

BIRDS BRED BY MR. C. J. BISSHOFF, 110 VERDOORN STREET, SUNNYSIDE, PRETORIA.

8-Month-old Cockerell. 1st Prize Pretoria Show, first time exhibited.

Black Orpington. Best Bird at Pretoria Show. Three Specials and One First at Pretoria and Two Specials and One First at Heidelberg.

The watering of cuts in rubber trees has been found, by experiments in the Federated Malay States, to be attended by a smaller yield of latex, owing, probably, to the coagulation induced by the water.

Messrs. J. C. Faure and H. Sonnenfeld, South African students in America, have been requested to act as representatives of the agricultural schools in the Union of South Africa at the Eighth International Congress of Students to be held at Cornell, United States of America, from the 29th August to the 13th September of this year.

The Department of Agriculture desires it to be known that the office of the Agriculturist will be transferred from Bloemfontein to the new Agricultural School, Glen, as from 1st July. Inquiries dealing with agricultural subjects should henceforth be addressed to the Acting Principal (Mr. M. J. Joubert), School of Agriculture, Glen, Orange Free State. Inquiries relating to horticulture should be similarly addressed, and will receive the attention of Mr. Shaw Scott, Holticulturist. Matters relating to the Tweespruit and Grootvlei Stud and Experimental Farms should be referred direct to the managers thereof.

ANONYMOUS LETTERS.—We have once more to remind our readers that no notice can be taken of anonymous letters. Correspondents are quite at liberty to use a *nom de plume* if they so choose, for publication purposes, but the full name and address of the writer must also be enclosed. We have beside us a letter signed "C. F. S. S."; and if the writer will supply us with his full name we shall be pleased to send him a reply to his inquiries. We have also a letter from "Boer," of Marquard, asking for certain information on black-quarter or sponsziekte. Will "Boer" please send us his name and full address?

CAPETOWN INQUIRY OFFICE.—Mr. F. B. Smith, Secretary for Agriculture, and his Parliamentary staff, returned to Pretoria on the 21st June. The Department's Inquiry Office will continue its functions in Capetown during the recess in the same manner as last year. Inquiries on any matters connected with agriculture may be made either in person or by correspondence to the Inquiry Clerk, Department of Agriculture, 73 Parliament Street, Capetown, P.O. Box 3, telephone 1874, telegrams "Landbouw." The officer in charge will furnish general information regarding the various activities of the Department of Agriculture, and will, when necessary, transfer communications requiring specific information direct to the officers of the Department concerned, so as to ensure all matters being treated as expeditiously as possible.

A NEW COTTON PICKER.—Reference is made in the Barbados *Agricultural News* to a new cotton picker, the mechanism of which consists of a 16-inch cylinder, 12 inches long, on which are mounted twenty spindle shaft frames each carrying seven spindles, making 140 picking fingers in all. As the cylinder revolves, the spindles are caused to revolve at high speed as they stand in a vertical position, and the cotton wraps around them. When they come to a horizontal position they are thrown out of gear and the cotton is stripped off and passed to a basket in the rear. It is claimed that this picker will do the work of from ten to twelve men, requiring only a team and a driver.

TREE LUCERNE.—We have received a number of inquiries lately regarding tagasaste or tree lucerne, and interest in this plant seems to

be steadily growing. Tagasaste is a good fodder for cattle and any other class of stock, but it certainly is not as good as the ordinary lucerne. Point for point there is not much difference in the nutrient value of the two plants, but, as will be readily understood, a single tree does not yield a heavy crop, whilst the plants have to be cut by hand after allowing them to grow into either hedges or bushes; in fact, tagasaste is an awkward crop to handle, whilst if the stock are allowed to graze the trees, they break and damage them enormously.

OSTRICH FARMING IN AUSTRALIA.—The *Pastoral Review* records that one of the biggest ostrich farms in Australia is that owned by Messrs. Cairnes & Sanderson, seventeen miles from Coonambie, New South Wales. The property comprises 7500 acres, 2500 of which are used as an ostrich farm, the remainder being devoted to sheep. Originally Captain Cairnes was at Gilgandra, where he commenced operations in 1905 with six pairs of ostriches, purchased in South Australia. The ostriches now number over 400, and none have been sold, the object being to increase the flock to 1000. The land is capable of carrying one sheep to two acres, and on 600 acres 100 ostriches can be maintained without difficulty, running on natural pasture alone. Lucerne is grown as an insurance against drought.

A MAIZE-BREEDING MATTER.—A discovery has been made in America of the proterogynous habit (i.e. maturing of the silks before the tassels) in a variety of maize introduced from Granada, Spain. In plants of this type the silks are put forth and are receptive before the pollen begins to fall. The matter is referred to in a recent circular of the United States Department of Agriculture, where it is further pointed out that the proterogynous characteristic ensures a much larger percentage of cross-pollinated seed than is obtained in the ordinary varieties in which the falling of the pollen is simultaneous with or precedes the putting forth, or exsertion, of the silks. If this character could be combined with improved American types it would obviate the necessity of detasselling to secure cross-pollinated seed. A small quantity of pure seed of this variety has been produced during the past season in America.

A RUST-RESISTANT OAT.—The Ruakura oat, a variety bred from a selected head of Argentine oat in the year 1908, by the Horticulturist of the Ruakura Experiment Farm, New Zealand, is claimed to be resistant to rust. The oat is now being produced on a scale sufficiently large to enable it to be practically tested under varying soil and climatic conditions throughout the Dominion. During the four years of its existence no sign of smut or root fungus has made its appearance on it, this while two other varieties growing in the same field and alongside it were affected with rust, smut, and root fungus, the last-named disease being particularly bad. It stood the test of six days of exceptionally wet, muggy weather without any perceptible change in the bright colour of the straw and seed head, while the other varieties in the paddock were turned almost black. The test was an undoubtedly severe one, and speaks volumes for the constitutional power of the new oat.

A FINE HACKNEY FILLY.—A desirable acquisition to the live stock of the Union has lately been made in the shape of the two-year-old Hackney filly, Hopwood Pauline. The purchase of this animal was made in England on a commission sent by a Cape breeder (whose name

does not yet appear) for the most promising filly in England. As her name suggests, Hopwood Pauline was bred by that good judge, the late Mr. Batchelor, in Warwickshire, and sired by Polonius; her dam is Towthorpe Iris by Forest Star, and she is thus full-sister to Sir Walter Gilbey's great stallion, Antonius. The *Live Stock Journal* says: "This chestnut is a grand type of show or brood mare, possessing, in addition to her good looks, size, and excellent limbs, the gift of brilliant action, moving all round in that same forceful and extravagant style as her brother Antonius. She has been stinted to Adbolton St. Paul—mating that should give satisfactory results to her enterprising new owner, who is to be congratulated on securing so typical and classical a Hackney filly."

# Correspondence.

This section will be set aside for correspondence on all subjects affecting the Farming Industries of the Union of South Africa and cognate matters; and, while every reasonable latitude will be allowed, contributors are requested to be as concise and succinct as possible in the expression of their views.

Suggestions for practical consideration and discussion, and hints as to improved methods applicable to any branch of agriculture will be particularly welcome.

It must at all times be distinctly understood that the Department of Agriculture is in no sense responsible for the views and opinions expressed in this section.

All communications should be clearly addressed "The Editor of the *Agricultural Journal*, Department of Agriculture, Pretoria," and written on one side of the paper only.

## CROSSING RIVERS.

To the Editor of the *Agricultural Journal.*

SIR,—In answer to Mr. Graham's letter, in which he thinks my plan of a rope across rivers would not always be successful in preventing drowning, I would point out that no plan scarcely could be devised to do this; but if only half the number of deaths owing to flooded rivers were thus prevented it would be worth the expense ten times over at least. For I suppose not less than two or three hundred natives and others are drowned yearly throughout the Union by this means.

The main point is this: A native comes to a drift; it is more or less in a flooded state. He is uncertain whether he can cross safely. However, being anxious to get to his kraal and family that night, he risks the danger. He goes in, gets half-way over, is swept off his feet, and that is the end. Now, if there were a rope stretched across tightly, to which he could hold, he would thus be able to get across safely, or if he found the current getting too strong as he neared the middle of the stream, he could return in safety to the bank. It seems to me perfectly obvious that thus scores of lives per annum would be kept from being needlessly thrown away for want of a little energy on the part of European farmers and others in stirring Parliament or

their local councils to provide so simple and inexpensive a means of saving life. We may be sure that if it were as many hundred Europeans concerned instead of natives the thing would soon be altered. I should like to appeal to General Botha, the powerful Minister of Agriculture, to move in the matter. No one, I think, could possibly raise any objection and most would gladly see it done. There are many farmers in the Union Parliament; will not some of them interest themselves in so important a matter, especially such as the Messrs. Schreiner, who are ever ready to do all they can for the natives?—Yours, etc.,

THEODORE B. BALTHWAYT.

Capetown.

*P.S.*—A gauge, such as Mr. Graham suggests, would be all right if we were angels and not human beings ready to run risks. But it would not be of much use in saving the native when he was half-way across and being swept off his feet, whereas a rope would. Still, a gauge would be an extra safeguard.

## "SOURCES OF NITROGEN."

To the Editor of the *Agricultural Journal.*

SIR,—With reference to Mr. Jamieson's interesting note *re* sources of nitrogen, it may be worth while to point out that another very promising source of nitrogen fixation from the atmosphere has within the past year become a commercial possibility. Dr. Haber, working for the celebrated Badische Fabriek in Germany, has, after nine years' arduous research, perfected and patented a commercial process by which atmospheric nitrogen may be made to combine with hydrogen—now generated in enormous volumes from water for balloons and air-ships. The mixed gases, at a very high temperature and pressure, are passed over reduced iron, and the resultant ammonia immediately removed from its influence. Thus a steady yield is obtained, otherwise the action is reversed and the nitrogen degenerated. This is an extremely gratifying result, as "no increase of ammonia from coal can be expected at all commensurate with the development of agriculture," and since the world's output of combined nitrogen, principally as ammonium sulphate and saltpetre, reached the enormous value of forty millions sterling last year, it is clear that any falling off even in the present supply would be a serious set-back to the industry of agriculture.

There are other methods of fixing atmospheric nitrogen that may force themselves to the front before long. These are heating alumina or silica (sand) in an electric furnace in an atmosphere of nitrogen, in presence of charcoal or graphite. All the substances required for these reactions are obtainable in enormous quantities in this country; the one thing otherwise necessary is, as Mr. Jamieson points out, cheap power. The few waterfalls we have may yet become the sources of the necessary energy to supply our land with its much-needed fertilizers at a low cost.—Yours, etc.,

F. J. POOLER (B.Sc.).

Jeppe High School, Johannesburg.

## A DIPPING QUESTION.

To the Editor of the *Agricultural Journal.*

SIR,—If you would allow me the space of a few lines in your valuable journal, with regard to dipping of cattle, I should very much like to ask any of your readers who have a knowledge of chemistry, whether arsenic exposed to heat has a tendency to lose its strength.

For example, I find that cattle, although they raise their tails during dipping operations, will still have ticks surviving under the root of their tails; whilst the other parts of their bodies are perfectly free from ticks. This clearly shows that the dip loses its poisonous properties under the tail, or that the dip must disappear very rapidly.

I should like to know whether the heat under the tail has any effect upon the toxic powers of the dip.—Yours, etc.,

A. D. WILLCOX.

Sugarbush.

[We referred the above letter to the Chemist (Mr. H. J. Vipond) and to the Acting Director of Veterinary Research (Dr. Robertson) for their views. Mr. Vipond replies that heat such as is referred to would have no effect on the arsenite of soda, although it might favour the oxidation to arsenate. He adds: "A more likely explanation would be that there is no hair on this part to retain the dip solution." Dr. Robertson agrees with Mr. Vipond in regard to the latter suggestion, and adds: "There is no difference in temperature between the surface of the body under the tail and, say, between the legs. It only feels hotter to the hand, because it comes in contact with the skin uncovered with hair."]

## FERTILIZERS AND THEIR APPLICATION.

To the Editor of the *Agricultural Journal.*

SIR.—As the officers of the Department of Agriculture should be in close touch with the farmers and may be expected to be fairly well acquainted with the agricultural conditions in the different parts of the Union, please obtain reliable advice for me on the undermentioned questions:—

(1) In employing a combined seed and fertilizer drill, at what rates per acre for seed and fertilizer should the machine be set for oats, barley, and wheat respectively, where grain, and not hay, is required for production?

(2) In the absence of Government guano and farm manure, which fertilizers, or combination of fertilizers, may be economically employed to ensure maximum yields?

(3) Is it economical to drill the fertilizer in with the seed, or may better results be expected when the fertilizer is broadcasted and mixed with the soil in the ordinary process of cultivation?—Yours, etc ,

FARMER.

Caledon, Cape Province.

[The Lecturer in Agriculture at Elsenburg School of Agriculture (Mr. P. Fowlie) replies:—(1) The quantities of seed which are found suitable at Elsenburg are as follows when grain is to be produced: Oats, 60 lb. per acre; barley, 40 lb. per acre; wheat, 30 lb. per acre. The quantity varies a little with the different varieties and with the time in the season when sowing is done; late sowings should have a little more seed allowed. The quantity of seed required varies in different districts, and I have not had an opportunity of visiting Caledon, but from what I know of the conditions I expect these quantities should give good results there. The quantity of fertilizer: This must, of course, depend upon what fertilizer is being used; 100 to 150 lb. of Government guano are commonly given, depending on the quality of the soil. (2) The following mixture of fertilizer will contain fertilizing constituents equal to 100 lb. of Government guano: 70 lb. nitrate of soda; 55 lb. basic slag; 5 lb. chloride (muriate) of potash. These substances may be mixed together and used instead of Government guano, but in my opinion more economical results are likely to be got by using more basic slag and muriate of potash and less nitrate of soda, say, 100 lb. basic slag; 50 lb. nitrate of soda; and 20 lb. muriate of potash; and I would recommend about these quantities per acre. Even where Government guano is available I think it is advisable to use basic slag along with it. (3) I do not think it makes much difference whether the fertilizer is drilled or broadcasted, and if the seed is being drilled it is economical, in my opinion, to drill the fertilizer at the same operation. Another advantage of drilling is that it ensures more even distribution than is usually secured by broadcasting. As nitrate of soda is a very soluble salt and is liable to be washed out of the soil by heavy rains, it is advisable when it is used to keep over all or most of it till the end of the rainy season and sow it as a top-dressing, being sure to choose a dry day for the operation, as, if it falls on damp leaves, it is liable to scorch them.]

## CHLOROSIS IN ORCHARD SOILS.

To the Editor of the *Agricultural Journal.*

SIR,—I have read with great interest the articles on chlorosis in fruit trees appearing in the last few issues of the *Journal*. Here the trees gradually die on account of this disease. Do you not think that it would help me if I opened

the sub-soil or made it porous with dynamite? At a distance of about 4 to 6 feet from the tree the dynamite could be put in, in two or three places. In some places in my orchard the soil, from 2 feet down, consists of white clay or limey very fine soil.—Yours, etc.,

J. SNEL.

Petrusburg, Orange Free State.

[The Chief Chemist, Government Analytical Laboratory, Capetown (Dr. C. F. Juritz), replies:—If in Mr. Snel's lands the chlorosis results from excess of water round the roots a proper draining of the soil will most likely cure the evil. If the water is retained about the roots, as in a basin, by a layer of what is called "hardpan," and if below that layer the soil is again more open, it may be possible to drain the surface soil by piercing through the hardpan in several places, as Mr. Snel suggests, with the assistance of dynamite. If, on the other hand, the water is retained not merely by a comparatively thin layer of hardpan, but because the whole mass of soil below the surface is dense and impermeable, it will not be enough to make *isolated* holes in the soil down from the surface. In such a case a *continuous* trench or under-drain is wanted, so that the superfluous water can be carried off. If by means of an under-drain (constructed, say, with 3-inch tiles) an open passage is made through the soil below the water-table, that is to say, below the level in the soil up to which all the spaces between the soil particles are filled with water, all the surplus water in the soil above the level of the tile drain (suppose it to be 4 feet deep) will be carried off thereby, and the air from above will be drawn down to occupy the spaces between the soil particles that were previously filled by water. From Mr. Snel's remarks it seems that his soil from 2 feet down consists either of a sort of kaolin of great density or of a white marl. In the former case the above remarks will still apply; in the latter the excessive calcareousness of the soil may have something to do with the chlorosis, but in either case it would be well to try the effects of proper drainage, at all events as a preliminary step.]

## TOBACCO QUERIES.

To the Editor of the *Agricultural Journal.*

SIR,—I shall be glad of information on the following points:—(1) The best time to plant tobacco seed in the Komgha District; (2) the best type of seed for Kaffir tobacco; (3) can Kaffir tobacco seed be had from the Chief of the Tobacco and Cotton Division, and the cost of same?—Yours, etc.,

W. SHARP GALLOWAY.

Komgha.

[The Chief of the Division of Tobacco and Cotton (Mr. W. T. Scherffius) replies:—(1) If you have plenty of irrigation on your farm I would suggest sowing a portion of your tobacco seeds-beds about the 1st July and make another sowing two weeks later, and so on. By this method all the plants will not come on and be ready for transplanting at the same time. If, however, you have no irrigation and have to depend upon the rainfall for transplanting, then I would advise you to begin sowing about ten weeks or three months before the usual time when the rains set in. (2) For Kaffir tobacco I would suggest the heaviest type that you can procure. (3) We have no Kaffir tobacco seed, but can supply seed of a fairly heavy type, such as "Clarksville Heavy." The Department sells tobacco seed at the rate of one shilling per ounce.]

To the Editor of the *Agricultural Journal.*

SIR,—Can uncured tobacco (Magaliesberg and Virginian) be disposed of on the market? If so, how much does it average?—Yours, etc.,

H. F. JUNIOR.

Filmerton, Bremersdorp, Swaziland.

[The Officer in Charge of the Tobacco and Cotton Experiment Station at Rustenburg (Mr. H. W. Taylor) replies:—The term uncured tobacco, as ordinarily used, refers to tobacco in the green state, or just as it comes from the field. There is no market for tobacco in this condition. However, if correspondent refers to tobacco which has been cured but not fermented, there is a market for it. The prices range from 1s. 3d. for yellow leaf down to 3d. for the lowest grade. The average price in this district is about 6d.]

## WHEN TO PLANT VINE CUTTINGS.

To the Editor of the *Agricultural Journal*.

SIR,—Could you kindly let me know when I can put in the ground cuttings from vines?—Yours, etc.,

A. H. GREEN.

P.O. Bloemhof, Transvaal.

[The Viticulturist of the Elsenburg School of Agriculture (Mr. S. W. van Niekerk) replies:—The best time for planting vine cuttings depends on the nature of the soil. Light warm soils should be planted earlier than cold damp soils. I presume the question of dampness has not to be considered. August will therefore be the best time to plant out cuttings. This may be even done in the latter half of July. If correspondent is troubled with frost, the latter half of August or the first week in September will be preferable. Cuttings should be well lignified and only those selected which have borne fruit the previous season (preferably two bunches). Cuttings do not only preserve the character of the mother-plant, but their own as well. With cuttings to be grafted this precaution is not necessary.]

## THE CARDOON.

To the Editor of the *Agricultural Journal*.

SIR,—Several people have asked me where the seeds of the Spanish Cardy are to be had. I bought mine of Oskar Knopff & Co., Erfurt, Germany; one shilling worth of stamps will secure a trial packet from them. No doubt if it is tried in all parts of the Union this next season our seedsmen will be offering it also. Soybeans (Southern Yellow) do well here, but none of them have more than four seeds in a pod. Those four in a pod I am keeping for seed.—Yours, etc.,

H. VIEDGE.

Tabase, near Umtata.

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To the Editor of the *Agricultural Journal*.

SIR,—You would do me a great favour by inserting the following. In consequence of my letter to Mr. Burtt-Davy, which was published in the April number of the *Agricultural Journal*, I am inundated by letters *re* Giant Spanish Artichoke. As I cannot answer them all, I beg to say that I hope to have a good supply of "Cardoon" seed in October or November next, when I shall advertise it in the *Farmers' Weekly* with full particulars.

So far I have tried the leaves as a feed for cattle, pigs, and sheep. Even horses will eat it when they get accustomed to it. As to ostriches, I cannot say for certain, as I have no ostriches here. In the meantime I should advise intending planters to try the ordinary globe artichoke. This is quite similar, and if you get the kind without thorns it may also answer the purpose.—Yours, etc.,

W. HELMBOLD.

Waaihoek, P.O. Wolvespruit,
Orange Free State.

## RIPENING OF DATES.

In reply to an inquiry from Dr. Günter, Omaruru, German South-West Africa, as to the methods in use in the ripening of dates after they have been picked from the tree, and te hlength of time they must be kept in order to prevent acidity from setting in, the Government Horticulturist (Mr. R. A. Davis) writes:—Very little has been done by human agency to assist in the ripening of the date. Given the correct situation, dates will mature on the tree in better condition than can be obtained from any other process hitherto practised. At the present time the Agricultural Department of the United States of America is undertaking experimental work in connection with the artificial ripening of dates, but so far nothing entirely satisfactory has been arrived at and no results have been published. Perfect conditions for dates,

including growth of palm and ripening of fruit, are secured with difficulty, unless they exist in a state of nature. They consist of (1) a generous supply of water at the roots; (2) a temperature which cannot be too hot, but can easily be too cold; (3) an absolutely dry climate during the period of ripening. Given the above, the dates will ripen on the trees in quite a satisfactory manner. As with other fruits the period during which maturity is arrived at is marked by a change in the colour of the date. Different varieties (and their name is legion) assume different shades of colour, varying from amber to reddish brown and occasionally black. The constituent parts of the date undergo considerable change during the final stage of ripening when sugar is produced in abundance, sometimes up to half the weight of the dried article. During this stage the fruit shrivels up and assumes that appearance with which most of us are familiar; in fact, is ripe. It happens, however, that on large bunches a certain proportion of the fruit is likely to ripen before the remainder. Such specimens are picked off, thus allowing those left an opportunity of ripening more quickly than they would otherwise do. When the whole bunch has been stripped the fruit is allowed to remain in boxes to "sweat" for a few days. During this process uniformity is arrived at with regard to moisture contents, and the fruit is then packed in smaller boxes ready for shipment. As with other dried fruits, such as the prune, where sugar is present in large quantities, no preservative treatment is necessary, and the fruit will keep good for a very long time. The above remarks apply to dates of good quality fit for dessert or eating out of hand, and deal naturally with the best varieties; such are dry and soft to the touch. There are others of a sticky nature, and these are dealt with in a more summary manner, being packed tightly into barrels, and often (by the Arabs) in hides. In some instances bunches of these sticky kinds full of an almost liquid sugar are hung up in the sun until the last drop has run out of them. This product is called "date honey," and is a saleable commodity.

## REMEDY AGAINST WEEVILS.

To the Editor of the *Agricultural Journal.*

SIR,—In reply to Mr. H. Bussche's query in your journal for May, I wish to state that I have found aloes to be a splendid remedy against weevils. If our friend were to place a lot of aloe leaves amongst his stock of bags containing the grain he will find that the weevils will all disappear.—Yours, etc.,

FARMER.

## WATER TANKS AND THEIR TREATMENT.

To the Editor of the *Agricultural Journal.*

SIR,—Many of your readers, chiefly in the country, may be in the same position as I am, dependent for their drinking water on tanks with rain-water from the roofs of their houses. Can you or any one give some sound advice as to the following:—

(1) Of what material should a tank be constructed, so as to be of permanent strength, and how large should they be?

(2) How should the intake be constructed, and where should it be, and how large?

(3) What precautions can be taken against small animals, vermin, flies, etc., from getting into the tank?

(4) How should the outlet be constructed—i.e. what sort and size of tap, where situated so as to let out all the water, how protected against getting loose, with consequent wastage of water?

(5) On which side of the house should a tank be placed, and on what sort of foundation, so as to prevent oxidation of the bottom?

(6) What can be done to keep the tank and the water therein cool, i.e. protect it from the burning sun? Is it advisable to plant creepers around the tank, or to tie any material around it, or make a roof of something over it, or paint or whitewash it?

(7) What can be done to keep the water drinkable and from becoming injurious to health during the many months when there is no rain and therefore no addition of new water?

(8) How often should a tank be cleaned, and in what way so as to be effectual?

(9) Is it necessary or of any use to whitewash the inside?

(10) Is there any danger of poisoning through tank water, and what has to be observed to prevent any such calamity?

I believe that many of your readers will be thankful for detailed answers and reliable advice on this matter.—Yours, etc.,

W. BEHRENS.

Bethanie, Rustenburg District.

[The Lecturer in Engineering at the Potchefstroom School of Agriculture (Mr. W. S. H. Cleghorne) replies:—(1) Corrugated iron: Size based upon number of persons to be supplied and duration of dry season. A minimum allowance would be five gallons per person per diem, not including water used for baths. (2) Intake may consist of a down pipe from the roof guttering passing through lid of tank and soldered thereto. It would probably be a 3-inch or 3½-inch pipe. (3) The top end of the tank should be closed in by a fixed sheet of galvanized iron which should be provided with a manhole door for cleaning out and inspection purposes, fitted with a dust-proof cover. A piece of wire gauze should be fixed over intake end of the down pipe where it leaves the guttering. This wire gauze should be convex upwards, and is intended to prevent dirt, leaves, dead insects, etc., being washed from gutter into tank. If near trees, the gutters should be cleansed out at least once every six weeks. (4) The outlet may consist of a 1-inch tap fitted with back and front nuts with leather washers between each of these and metal of tank. It should be fitted on first corrugation (convex outwards) from bottom of tank. The part of this corrugation where tap is to be fixed should first be flattened with a hammer. The washers before being placed in position may first be smeared with a mixture consisting of equal parts of red and white lead mixed in varnish to the consistency of a thick paste. (5) Position of tank: Tank may be placed in best position possible having regard to the following:—It should be protected from the sun and near the kitchen. If the house is already built and guttering fixed, then the tank must be placed so that the intake pipe leaves the guttering at its lowest point. A good foundation may be made of brick or stone work. Let the foundation dry, and tar the bottom of the tank before placing it in its final position on foundation. After tank is placed re-tar its bottom, especially along junction of tank and foundation. This will exclude water and prevent corrosion. (6) If the water must be kept very cool build the tank round with brick, leaving a few inches space between brickwork and outside of tank. Put a roof over brickwork, leaving it open round eaves. A simpler, though not so effective, method of keeping the water cool would be to paint outside of tank with white paint. Whitewash is not advisable, as it may eat away the zinc and iron. (7 and 8) Inspect tank regularly and clean during rainy season when found necessary. Thoroughly sweep roof with stiff brush, clean gutters, and wash out tank with soda just before the rainy season starts. Use a filter in house if desired. (See answer to question 3.) (9) There is no particular object in whitewashing inside of tank. In any case the whitewash would come off in flakes within a short time. (10) Little danger of poisoning exists if the above precautions with regard to cleaning tank and guttering and exclusion of dirt be followed.]

# Egg-laying Competitions.

MR. W. O. JOHN, Poultry Division, School of Agriculture, Elsenburg, writes: —

On behalf of the Department of Agriculture I herewith submit report on my visit to Rosebank laying competition on 2nd June. Will those who have sent birds to this competition please note that the pen numbers have been altered; I am given to understand that owners of pens have been notified of this fact.

Mr. West, who was in charge of the birds, kindly supplied me with the figures of the ten leading pens, which are as follows:—

| Pen No. | Breed. | No. of Eggs Laid. |
|---|---|---|
| 4 | White Wyandottes | 81 |
| 7 | White Leghorns | 70 |
| 18 | White Leghorns | 65 |
| 27 | White Leghorns | 59 |
| 31 | White Leghorns | 60 |
| 28 | Black Leghorns | 61 |
| 8 | Brown Leghorns | 45 |
| 20 | White Leghorns | 44 |
| 19 | White Leghorns | 39 |
| 10 | White Leghorns | 39 |

Each pen in the competition contains six birds, so it will be seen that above records are not by any means high, the leading pen giving only a pen average of 13½ eggs per hen per month. Hens are not trap nested on this competition; the pen averages only are taken.

The weather has been anything but favourable to heavy egg yields, the beginning of the month being warm and close, then came cold winds and fog, and towards end of the month cold rains.

With two exceptions the health of the birds is good, and are looking remarkably fit and active. The exceptions are: A hen from pen 31 is suffering from vent gleet; she is in hospital under treatment; also a hen from pen 20 has been in hospital during practically the whole month; very shortly after arrival this bird developed chicken-pox, which later developed into roup. This bird is now improving, but pen 20 has suffered owing to the loss of one bird for the whole month; also pen 31 has only contained five hens for the greater part of the month. Pen 16 went into full moult, which has given them a considerable set back; still they are getting through it rapidly, and I have no doubt will make good later.

Feeding is as follows:—Morning: Red wheat, in scratching litter. Midday: Sprouted oats and lucerne. Evening: Mash, composed of 42½ per cent. bran, 42½ per cent. pollard, 15 per cent. whale meat meal, and shell and grit *ad lib.*

It may interest your readers to know that the Poultry Division at Elsenburg are this year keeping a strict record of eggs laid by the birds in the breeding pens, with the object of finding out if climatic changes have a detrimental effect on the birds or not.

These birds have not been brought together for the purpose of competing one against the other, but rather as breeding pens. It

should be noted that the pens do not contain an equal number of hens, the smallest pen being three hens and the largest six hens.

The following is their record for the month of May:—

| Pen No. | No. of Hens in Pen. | Breed. | No. of Eggs Laid. | Remarks. |
|---|---|---|---|---|
| 1 | 3 | Indian Game ... ... ... ... | 23 | |
| 2 | 4 | Black Plymouth Rock ... | 30 | |
| 3 | 4 | White Plymouth Rock... | 67 | 1 hen broody 7 days. |
| 4 | 6 | White Wyandottes ... ... | 86 | |
| 5 | 3 | Barred Rocks ... ... ... ... | 50 | |
| 6 | 5 | White Leghorns ... ... ... | 67 | |
| 7 | 6 | Black Minorcas ... ... ... | nil. | |
| 8 | 6 | Black Leghorns ... ... ... | 61 | |
| 9 | 6 | Brown Leghorns ... ... ... | 32 | |
| 10 | 4 | White Orpington... ... ... | 94 | 2 hens broody, average 3 days each. |

No trap nests are used, pen averages only being taken. Pen 10 here gives the splendid average of 23½ eggs per hen.

The weather here has been anything but ideal during the month, and the situation of pens is very exposed; still many of the pens have done fairly well for the time of year.

## ROSEBANK EGG-LAYING COMPETITION.

### WESTERN PROVINCE AGRICULTURAL SOCIETY.

(*1st May*, 1913, *to* 30*th April*, 1914.)

RECORD FOR MAY, 1913.

| Pen Number. | Owner. | Variety. | Record for May. |
|---|---|---|---|
| 1 | F. T. Mills ... ... ... ... | White Rocks ... ... ... | 22 |
| 2 | N. H. M. Cole ... ... ... ... | White Wyandottes ... ... | 21 |
| 3 | F. T. Mills ... ... ... ... | White Rocks ... ... ... | 0 |
| 4 | S. C. Skaife ... ... ... ... | White Wyandottes ... ... | 81 |
| 5 | E. F. Watermeyer ... ... ... | Croad Langshans ... ... | 14 |
| 6 | H. H. Bright ... ... ... ... | White Leghorns... ... ... | 8 |
| 7 | S. Smith ... ... ... ... ... | " ... ... ... | 70 |
| 8 | N. H. M. Cole ... ... ... ... | Brown Leghorns ... ... | 45 |
| 9 | Jas. Cook... ... ... ... ... | White Leghorns... ... ... | 35 |
| 10 | R. G. Hudson ... ... ... ... | " ... ... ... | 39 |
| 11 | N. H. M. Cole ... ... ... ... | " ... ... ... | 37 |
| 12 | Hatherley Poultry Farm ... ... | " ... ... ... | 23 |

| Pen Number. | Owner. | Variety. | Record for May. |
|---|---|---|---|
| 13 | C. S. Boyes ... ... ... ... | White Leghorns... ... .. | 34 |
| 14 | H. H. Bright ... ... ... ... | " ... . ... | 12 |
| 15 | Mrs. R. F. Dott ... ... ... ... | " ... ... ... | 32 |
| 16 | T. Vollmer ... ... ... ... | " ... ... ... | 2 |
| 17 | " ... ... ... ... | " ... ... ... | 6 |
| 18 | C. W. Baldock ... ... ... ... | " ... ... ... | 65 |
| 19 | S. Smith ... ... ... ... ... | " ... ... ... | 39 |
| 20 | Mrs. R. Archibald ... ... ... | " ... ... ... | 44 |
| 21 | B. Kauffmann ... ... ... ... | " ... ... ... | 36 |
| 22 | G. J. V. Biccard... ... ... ... | " ... ... ... | 13 |
| 23 | C. S. Boyes ... ... ... ... | " ... ... ... | 2 |
| 24 | H. H. Bright ... ... ... ... | " ... ... ... | 12 |
| 25 | S. Smith ... ... ... ... ... | " ... ... ... | 14 |
| 26 | W. L. H. Rose ... ... ... ... | " ... ... ... | 25 |
| 27 | H. N. Wheeldon... ... ... ... | " ... ... ... | 59 |
| 28 | B. Kauffmann ... ... ... ... | Black Leghorns ... ... ... | 61 |
| 29 | O. C. Macpherson ... ... ... | White Leghorns... ... ... | 23 |
| 30 | W. and H. Meihuizen ... ... ... | " ... ... ... | 18 |
| 31 | Graham Hope & Co. ... ... ... | " ... ... ... | 60 |
| 32 | H. Curtis... ... ... ... ... | " ... ... ... | 20 |
| 33 | A. Aitken... ... ... ... ... | " ... ... ... | 5 |
| 34 | R. G. Hudson ... ... ... ... | " ... ... ... | 19 |
| 35 | H. H. Bright ... ... ... ... | Black Leghorns ... ... ... | 0 |
| 36 | G. J. V. Biccard... ... ... ... | White Leghorns... ... ... | 19 |
| 37 | W. H. Hart ... ... ... ... | " ... ... ... | 13 |
| 38 | R. G. Hudson ... ... ... ... | " ... ... ... | 10 |
| 39 | B. Kauffmann ... ... ... ... | " ... ... ... | 32 |
| 40 | Mrs. R. A. Leggatt ... ... ... | Anconas ... ... ... ... | 15 |

## MANAGER'S REPORT FOR MAY, 1913.

The fifth egg-laying competition of the Western Province Agricultural Society commenced with forty-eight entries of six birds in each pen; eight pens however did not turn up, so a renumbering was made.

The pens are almost ideal in situation facing due east with clear open space for runs, the last few feet at the back being nicely shaded by oak trees from the sun during the hottest hours of the day. The houses are semi-detached, of wood well covered by solignum, with floors gravelled and made firm and damp-proof by tar and are placed nearly midway in the runs. An enclosed path runs the whole length of the pens from which access is obtained to each one.

The start was not made under very favourable conditions, the thermometer for the first few days registering a day temperature of 91 degrees in the shade, and a night one of 65 degrees with sultry atmosphere; succeeded by a sudden drop to 49 degrees day and 39 degrees night with cold fog, and on the 7th heavy showers of rain in the evening, in fact the month has been one of extremes.

This caused birds in twenty-eight of the pens to go into more or less of a moult and the runs and houses from the 10th of the month have been strewn with feathers. The pens are going satisfactorily through with it, and No. 17 has started laying again, every bird having moulted.

Pens Nos. 1, 2, 3, 4, 7, 8, 13, 20, 27, 28, 35, and 40 are the only ones which have escaped so far. The birds of pen 40 caught a chill on the journey, having to be nursed through catarrh, bird No. 46 taking some time to recover. They are now looking very fit.

Eight pens had to be treated for warts or chicken pox, also traceable to the sultry weather, causing heated blood. Some authorities attribute the complaint to mosquito bites, but no direct evidence is yet given to prove this, although at the time there were numbers of these insects about the pens. Sores break out over the face and comb and become scabby and dry; these should be at once treated as it is contagious. Wash with strong disinfectant and mix lime ointment, sulphur, and lard and smear over, giving the birds a dose of epsom

salts and plenty of green food. No. 130 of pen 20 developed (after recovery of warts) a bad attack of diphtheric roup, causing constant attention in removing cheesy growths from the throat and mouth, washing with strong disinfectant and dressing with perchloride of iron and glycerine. It is now feeding well again, gaining weight and running about in hospital, but will be subject to a return of the complaint and is sure to be a handicap to the pen. I have never treated a worse case.

Three pens were also dosed for worms, one bad case, not quite well. Two pens were sent with scaly leg and took up valuable time dressing with paraffin and afterwards lard and sulphur. Owners of such birds run the risk of having them rejected. The last day of the month saw another bird in the hospital, No. 76 of pen 31, with cloacitis ulcerations of the vent, a contagious malady to be dreaded, requiring syringing frequently with strong disinfectant in oil, and careful feeding. I hope to pull her through.

In taking a glance through the pens, one is struck with the evenness of some of them, each bird a counter-type of its five fellows in size and type, and the uneven character of other pens with birds from about six months to two years old and varying considerably in other respects. I think competitors whose birds are even stand a better chance in the competition; also the win last time of a two-year old pen has apparently induced some to try this age, losing sight of the fact that it is against experience in the great majority of trials.

It will be interesting to watch the result of the present one in this respect.

I also think that some of the competitors have put a handicap on their birds in not preparing them beforehand by adapting the same system of feeding, etc., used here. Some pens did not for some time take to the morning feed of wheat thrown in the chaff, whilst others were evidently not used to the night soft food and one pen has yet to be put on the perch every night. Everything, whether change of locality, system of feeding and housing and anything which disturbs or frightens the birds tells against the egg production. One instance goes to prove this in the present competition. The removal here caused one hen to drop two eggs without shells in one lump on the dropping-board after her arrival and she did not lay for several days again.

With no trap-nesting in this competition it is rather difficult to spot the birds when anything occurs to require treatment, but so far I have been successful, and longer acquaintance with them should help this.

Only two pens have not laid at all, No. 3 being young, and No. 35 is rather unaccountable, as they look in the pink of condition and certainly should commence any time.

All the birds have gained weight, as should be in the cold weather, and readily take their food now while the eggs are gaining in size, although there will have to be more improvement in this respect with several pens by the 1st July.

The weather from about the middle of the month promises a wet and cold winter, which should help to prove what is the value of the new South African utility type of White Leghorns so many pens consist of, whilst the remainder with the five pens of heavy breeds have their old reputation to keep up, one of the latter being first for this month with a total of eighty-one eggs.

With the two exceptions mentioned the health of the birds is good.

S. A. WEST, Manager.

# Farm Employment.

NOTE.—*This section is open to persons desiring to obtain employment on the land, and to farmers who require farm assistants. Notices are inserted in several succeeding issues; and advertisers are requested to advise the Editor as soon as their requirements are filled in order that their notices may be deleted.*

SITUATIONS WANTED.

Applicant, 30 years' experience in farming in South Africa in every branch, including ostriches, cattle, sheep, horses, general agriculture and fruit farming, wants position as farm manager. Speaks Dutch and English fluently. Excellent references.—ApplyH. D. VILJOEN, 17 Pretorius Street, Pretoria. [5]

English woman, holding first class certificate in dairy work, and having many years' practical experience, wishes to obtain work in creamery. Would undertake the management of a dairy, or any suitable employment. Has lectured and demonstrated for county councils in England.—C. G., c/o *Agricultural Journal* Office, Pretoria. [5]

Applicant, 27 years of age, German, desires position on farm in Transvaal as genera manager, on salary or salary and share basis. Brought up on farm in Transvaal. Has thorough experience of general farming, cattle breeding, and dry-land farming. Has at present a position as manager, and receives £20 per month.—J. H. F., Box 14, Grootfontein North, German South-West Africa. [5]

Situation wanted as farm manager by a steady, reliable, and hard-working man, 31 years of age. Has had 15 years' experience in every branch of farming, thoroughly understands the management of natives. Competent sheep judge. Holds best of testimonials. Apply, stating salary, to "RENNOX," Grasslands, Cathcart, C.P. [5]

Advertiser, with Free State, Transvaal, and Rhodesian experience, desires post as manager. Age 33, married, one child. Good references as conscientious, capable worker.—A. F., *Agricultural Journal* Office, Pretoria. [5]

A healthy, steady young farmer, 29 years of age, unmarried, desires situation on farm. Born in South Africa, thoroughly understands farming in all its branches, cattle, sheep, and horses, also agriculture.—94, c/o G. H. COCKEROFT, P.O. Balfour, Heidelberg, Transvaal. [6]

Employment wanted by applicant, 40 years of age, with family. 25 years' experience in stock and agricultural farming. Will accept employment in any part of the Union.—D. J. ERASMUS, c/o G. Nel, 66 Delarey Street, Vrededorp, Johannesburg. [6]

A steady, healthy man of 26 years of age (married) desires situation on farm as manager. Thoroughly acquainted with general farming business. Speaks Dutch and Kaffir only.—J. L. FOURIE, Slaapkrantz, P.O. Clifford, Barkly East. [6]

Young colonial-born Englishman, age 18 years, desires position as learner on South African farm, Natal Province preferred. Strong, healthy, and willing to do any hard work.—EDWARD COX, Box 126, Pietermaritzburg. [6]

Scotsman (30), well educated, active, healthy, offers services in return for board, lodging, and nominal salary. Highest references.—GRANT, Box 4675, Johannesburg. [6]

Situation wanted on farm by married man, age 50 years. Has one son. Has experience of general farming. Testimonials can be given.—D. J. STEYN, P.O. Belfast, Transvaal. [6]

Learner on farm, age 36, with 5 months' sound experience in up-to-date farm work, wishes position with small salary and board.—EDGAR, Box 2247, Johannesburg. [6]

Applicant, age 24, desires position as manager or overseer of sheep farm. Good testimonials from leading Australian sheep-breeders.—T. PICKBURN, P.O. Box 2337, Johannesburg. [6]

Position as farm manager wanted by thoroughly practical farmer, experienced in both stock of all descriptions and agriculture, including ostriches and cultivation of lucerne. Married.—H. P. NEL, Tweefontein, Middelburg, C.P. [7]

Young man, age 20, brought up on farm, desires situation on farm, preferably in Eastern Province. Has attended Elsenburg School of Agriculture for two years; first class references; strong and not afraid to work; speaks kaffir well.—H. C. TROW. Butterworth, Transkei. [7]

Situation wanted on farm as manager by married man (no children), 49 years of age. Experienced in cattle and sheep farming in Natal and high veld. Stock inspector for two years. Will work either for salary or in return for stock. Good references. High veld or Orange Free State preferred.—T. C. VAN ROOYEN, c/o Mr. F. Lademan, Doornkloof, P.O. Box 93, Premier Mine, Transvaal. [7]

A young South African desires position on sheep and agricultural farm in Transvaal or Cape Province as pupil.—J. C. P., "Rus-in-Urbe." Park Street, Belgravia, Johannesburg. [7]

Situation desired as farm manager in Transvaal, Orange Free State, or Cape Province. Experienced in all branches of general and stock farming, including ostriches. Speaks English and Dutch. State terms.—F. PIENAAR, Rustenburg, Transvaal. [7]

Englishman, age 27, single, wants management of farm. Fully qualified to take charge of dairying, hand rearing calves, horse-breeding, stallions, and agriculture, wire-fencing, and tree-planting. English experience and four years' South African. Speaks Dutch—GHEEN, c/o G. Tylden, Esq., J.P., Appledore, Don Don, Ladybrand, O.F.S. [7]

Young German, age 25, dairyman (European school), eight months' sound experience in South Africa, wants position on farm at once.—W. EDMAYR. 22 Syndicate Street, Maritzburg, Natal. [7]

## SITUATIONS VACANT.

Wanted on a farm, suitable for cultivation of tobacco, cotton, and maize, a young man of between 18 and 20 years of age. Part of crops will be given.—LOUIS G. TRICHARDT, P.O. Braakkloof, Rustenburg. [6]

Young man who wishes to learn farming wanted on a farm four hours from Middelburg, Transvaal.—F. J. VAN EEDEN, P.O. Boesmans Pan, Middelburg, Transvaal. [6]

The undermentioned offers (*a*) 80 morgen of arable land on half share. Owner will provide all implements, etc., except servants; (*b*) 200 morgen of uncultivated land at 1/3rd share; (*c*) six burgher-right erven at Belfast, situated near to or adjoining each other, and are suitable for growing potatoes. Can be had by paying annual rates and taxes on these erven. For (*a*) and (*b*) persons possessing some stock will receive preference.—R. A. KNIPE, P.O. Tweedronk, Standerton. [6]

Farmer on south coast of Natal, who has met with a shooting accident, is compelled to be absent for a long time and desires a person to take care of the property. He offers the use of several hundred acres of good land with plenty of water, some fruit trees, a dwelling-hut, shed, tanks, complete equipment of implements, and a couple of trek-oxen free of rent. If desired, a term of years can be arranged.—C. ROSITZKY, Port Shepstone, Natal. [6]

Opportunity for young man to learn fruit farming and preserving.—L. REICHE, Houtboschdorp, P.B. Haenertsburg. [6]

Miss A. E. Pullinger, well known in the bee-keeping world, has a vacancy for one pupil for the approaching active season. Terms to be arranged.—Address, Freshwater Apiary, Berg River Station, C.P. [7]

Man with first-class stock and agricultural farm wants partner with capital of £1500 to invest in certain class of breeding stock, not subject to any disease prevalent in South Africa. No costs attached to breeding this particular class of animals. Return of at least 75 per cent. per annum of invested money guaranteed.—Apply C.L., 14 Pretorius Street, Pretoria. [7]

Experienced man wanted to take over large orchard, chiefly apples, either on salary or share.—"ORCHARD," Clocolan, O.F.S. [7]

Farm assistant wanted—one experienced in thrashing and shelling machinery.—"OUTFIT," Clocolan, O.F.S. [7]

Young man required, age from 20 to 25, for farm in Vredefort District. Must be able to work with plough and oxen, and know how to cultivate tobacco. Must also be willing to do any other work on farm. One with good testimonials (and, if possible, a South African) preferred. Applications received up to 15th August. Successful applicant will be required to start as early as possible in September. Terms to be arranged by correspondence.—W. BORNMAN, Rietspruit, P.O. Vredefort, O.F.S. [7—0]

# The Weather.

By C. STEWART, B.Sc., Chief Meteorologist, Department of Irrigation.

THE mean air temperature over the Union during the month of May was just one degree above the normal, due to higher day temperatures, but varying between an excess of 3·6 degrees at Bedford (Cape) and a deficit of 2 degrees at Queenstown and Lindley.

There has been an almost general deficiency in the rainfall throughout the Union, varying from 100 per cent. at Philipstown in the northern Karroo to 25 per cent. at numerous other stations, the only exceptions being a few stations in the Transvaal, East London and Kokstad in the Cape Province, and Maritzburg in Natal.

The rainfall for the year (since 1st January) has also been generally below the normal, except at Griquatown, Fraserburg, Kokstad, Beaufort West, Uniondale, and East London in the Cape, and Christiana, Belfast, and Pilgrims Rest in the Transvaal. There has been an excess in Natal, accounted for by the abnormally heavy rains in March.

Frosts have been reported as having occurred at several stations during the latter part of the month.

These have not, however, as a rule, been very severe.

### AUGUST WEATHER CHARACTERISTICS.

Along the west coast and over the Cape Peninsula the rainfall during the month of August is decreasing; but in the south-western districts the precipitation usually exceeds that of the previous month. The general tendency over the remainder of the Union is towards an increase, although the month may be quite rainless inland. The normal rainfall is about 6·0 inches over the Cape Peninsula, 3·0 inches in the Cape south-western districts, 2·0 inches along the south coast, 1·5 inches in the south-east of the Cape, along the west coast, and in Zululand; 1·0 inch in Natal, Basutoland, in the Cape north-eastern districts, and Kaffraria; and less than 1·0 inch in other parts of the Union.

The mean temperature of the air is now increasing rapidly inland, where sunny days and cloudless skies preponderate, and slowly along the coastal districts. A mean of about 64° should be reached in the Transvaal low veld, while the normal in Natal is 61°, in the south-east of the Cape and along the south coast, 58°; over the east-central Karroo, 56°; in the Cape Peninsula, on the southern Karroo, and over the northern borders, 55°; in the Transvaal and over the Cape south-western districts and along the west coast, 54°; on the west-central Karroo, 53°; in the Cape north-eastern districts and Basutoland, 51°; and in the Orange Free State and on the northern Karroo, 50°. Frosts are still of frequent occurrence.

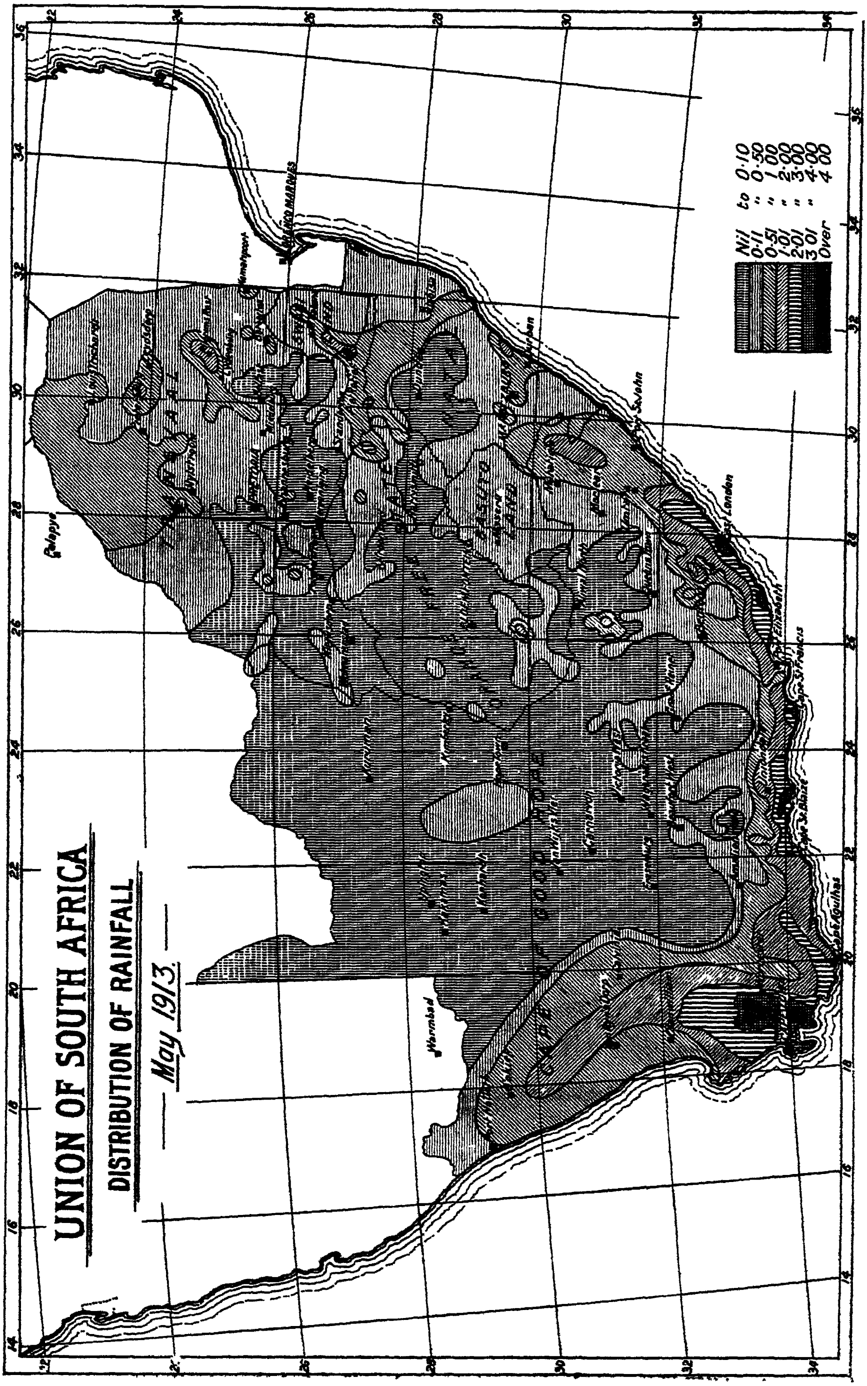
In the south-east of the Cape the prevailing winds are from a north-easterly and westerly direction, while in the north of that Province they are from the east-north-east, and in the Transvaal from the north-west. Cold southerly winds are, however, not uncommon.

OBSERVATIONS OF TEMPERATURES (FROM SELF-REGISTERING THERMOMETERS IN THERMOMETER SCREENS)—MAY, 1913.

| PLACE. | OBSERVER. | MONTH—MAY, 1913. | | | Normal Monthly Temperature. | Difference from Normal. | EXTREMES. | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean Max. | Mean Min. | Monthly Temperature. | | | Highest. | Date. | Lowest. | Date. |
| | | ° | ° | ° | ° | ° | ° | | ° | |
| *Transvaal*—Louis Trichardt ... | Sergt. J. C. N. Clark | 74·4 | 50·8 | 62·6 | 60·1 | +2·5 | 86·0 | 13th | 38·0 | 31st. |
| Pietersburg ... ... | W. Frankleyne ... | 72·2 | 45·7 | 58·9 | 58·1 | +0·8 | 82·0 | 17th | 35·0 | 30th. |
| Zeerust ... ... | H. Dietrich, J.P. ... | 72·0 | 39·8 | 55·9 | 56·8 | —0·9 | 81·1 | 9th | 25·4 | 26th. |
| Pretoria (Arcadia) ... | J. Lyall Soutter ... | 72·8 | 40·9 | 56·9 | 56·7 | +0·2 | 82·1 | 9th | 27·6 | 20th. |
| Belfast ... ... | G. J. Imrie... ... | 58·0 | 45·0 | 51·5 | 51·2 | +0·3 | 69·0 | 8th | 23·0 | 25th. |
| Mbabane (Swaziland). | A. C. Hulett ... | 69·9 | 47·7 | 58·8 | 59·6 | —0·8 | 79·5 | 16th | 38·4 | 30th. |
| Johannesburg (Obser.) | Staff ... ... | 63·4 | 45·7 | 54·6 | 54·5 | +0·1 | 72·5 | 19th | 32·4 | 24th. |
| Potchefstroom ... | J. R. Stenning ... | 72·2 | 38·0 | 55·1 | 54·3 | +0·8 | 80·6 | 8th | 22·0 | 20th. |
| Christiana ... ... | S. W. Davis ... | 76·1 | 38·5 | 57·3 | 56·2 | +1·1 | 86·0 | 9th | 24·0 | 18th & 19th. |
| Komatipoort ... ... | H. J. Evans ... | 82·3 | 54·9 | 68·6 | 68·1 | +0·5 | 98·0 | 18th | 41·0 | 30th. |
| *Free State*—Bloemfontein ... ... | J. Arndt ... ... | 66·2 | 38·8 | 52·5 | 53·0 | —0·5 | 76·8 | 9th | 27·1 | 19th. |
| Lindley ... ... | J. Oates ... ... | 66·3 | 32·5 | 49·4 | 51·4 | —2·0 | 76·0 | 9th | 18·5 | 20th. |
| Harrismith ... ... | J. B. Patterson ... | 63·1 | 38·2 | 50·6 | 49·1 | +1·5 | 72·0 | 8th & 12th | 25·0 | 24th. |
| *Natal*—Durban ... ... | Capt. Black ... | 71·8 | 60·3 | 66·0 | 67·8 | —1·8 | 77·0 | 16th | 53·0 | 30th. |
| Maritzburg ... ... | Govt. Asylum ... | 76·4 | 45·7 | 61·0 | 61·9 | —0·9 | 89·0 | 11th | 35·0 | 20th. |
| Dundee ... ... | T. Kenny ... ... | 74·0 | 42·5 | 58·2 | 55·9 | +2·3 | 82·0 | 13th | 33·0 | 26th & 29th. |
| Hlabisa ... ... | J. Swarbrick ... | 78·7 | 58·3 | 68·5 | — | — | 83·0 | 18th | 52·0 | 29th. |
| *Cape*—Kuruman ... ... | G. Bean ... ... | 69·7 | 34·5 | 52·1 | — | — | 79·5 | 9th | 21·0 | 23rd. |
| Hanover ... ... | A. Kershaw... ... | 72·6 | 32·1 | 52·3 | 50·0 | +2·3 | 88·0 | 31st | 19·0 | 24th. |
| Aliwal North ... ... | A. Brown ... ... | 70·5 | 32·5 | 51·5 | 51·8 | —0·3 | 82·5 | 10th | 21·0 | 26th. |
| Kokstad ... ... | H. D. Coyte ... | 67·2 | 36·8 | 52·0 | 53·7 | —1·7 | 76·9 | 7th | 25·9 | 20th. |
| Murraysburg ... ... | A. Cameron ... | 65·1 | 38·3 | 51·7 | 51·5 | +0·2 | 78·0 | 11th | 23·0 | 24th. |
| Clanwilliam ... ... | W. J. Downes ... | 75·0 | 50·2 | 62·6 | 60·8 | +1·8 | 97·0 | 11th | 51·2 | 21st. |
| Queenstown ... ... | A. Brown ... ... | 68·1 | 38·1 | 53·1 | 55·2 | —2·1 | 79·0 | 11th & 15th | 29·0 | 20th, 21st, & |
| Bedford ... ... | Thos. Hall ... ... | 77·5 | 47·1 | 62·3 | 58·7 | +3·6 | 86·0 | 5th | 36·0 | 20th. [26th. |
| East London ... ... | M. C. Grogan ... | 72·8 | 53·0 | 62·9 | 62·4 | +0·5 | 91·0 | 16th | 45·0 | 27th & 30th. |
| Amalienstein ... ... | Rev. C. Prozesky ... | 72·4 | 44·4 | 58·4 | 57·8 | +0·6 | 90·0 | 10th | 33·0 | 26th. |
| Capetown (Observatory) | The Staff ... ... | 68·5 | 53·2 | 60·8 | 58·9 | +1·9 | 88·9 | 1st | 40·4 | 25th. |
| Wynberg ... ... | Sister Mary Imelda | 70·2 | 50·6 | 60·4 | 59·6 | +0·8 | 88·5 | 3rd | 40·2 | 25th. |
| Mossel Bay ... ... | A. Draper ... ... | 70·1 | 51·0 | 60·5 | 61·2 | —0·7 | 90·0 | 4th | 44·0 | 25th. |
| Port Elizabeth ... | P. E. Morgan ... | 71·9 | 53·7 | 62·8 | 62·2 | +0·6 | 95·0 | 11th | 45·0 | 18th. |

## RAINFALL RETURN FOR MAY, 1913.

| PLACE. | OBSERVER. | MONTH. | | | YEAR. | | |
|---|---|---|---|---|---|---|---|
| | | May, 1913. | Normal. | Difference from Normal. | From 1st Jan., 1913. | Normal. | Difference from Normal. |
| *Transvaal—* | | ins. | ins. | ins. | ins. | ins. | ins. |
| Komatipoort ... | H. J. Evans ... | 0·63 | 0·66 | —0·03 | 14·86 | 16·01 | —1·15 |
| Christiana ... | S. W. Davis ... | — | 0·56 | —0·56 | 14·53 | 12·51 | +2·02 |
| Pilgrims Rest ... | E. Elphinstone ... | 1·64 | 1·15 | +0·49 | 24·56 | 25·72 | —1·16 |
| Belfast ... ... | G. J. Imrie ... | 0·35 | 0·52 | —0·17 | 17·41 | 16·44 | +0·97 |
| Zeerust ... ... | H. Dietrich, J.P.... | 0·01 | 0·93 | —0·92 | 13·85 | 15·32 | —1·47 |
| Potchefstroom ... | J. R. Stenning ... | 0·02 | 0·74 | —0·72 | 12·72 | 14·76 | —2·04 |
| Pretoria (Arcadia) | J. Lyall Soutter... | 0·10 | 0·47 | —0·37 | 17·68 | 16·88 | +0·80 |
| Standerton ... | A. von Backstrom | 0·15 | 0·57 | —0·42 | 15·70 | 16·52 | —0·82 |
| Pietpotgietersrust | S.A. Riflemen ... | 0·62 | 0·42 | +0·20 | 17·27 | 13·66 | +3·61 |
| Johannesburg ... | Observatory Staff | 0·06 | 0·70 | —0·64 | 12·50 | 16·68 | —4·18 |
| Louis Trichardt ... | Sgt. J. C. M. Clark | 0·43 | 0·82 | —0·39 | 17·76 | 17·60 | +0·17 |
| Pietersburg ... | W. Frankleyne ... | 0·63 | 0·20 | +0·43 | 14·20 | 11·29 | —2·91 |
| Middelburg ... | Dr. H. A. Spencer | 0·19 | 0·52 | —0·33 | 12·29 | 14·95 | —2·66 |
| *Swaziland—* | | | | | | | |
| Mbabane... ... | Swaziland Police | 0·13 | 1·21 | —1·08 | 27·08 | 27·63 | —0·55 |
| *Natal—* | | | | | | | |
| Maritzburg ... | Govt. Asylum ... | 0·97 | 0·83 | +0·14 | 30·88 | 16·12 | +14·76 |
| Dundee ... ... | I. Kelly ... ... | — | 0·53 | —0·53 | 17·87 | 18·50 | —0·63 |
| Hlabisa ... ... | J. Swarbrick ... | 0·52 | 0·78 | —0·26 | 34·26 | 18·27 | +15·99 |
| Port Shepstone ... | A. B. Cox ... | 0·33 | 1·58 | —1·25 | 29·18 | 22·63 | +6·55 |
| Bulwer ... ... | A. Brown ... | 0·70 | — | — | 30·89 | — | — |
| Durban ... ... | Capt. Black ... | 0·97 | 2·02 | —1·05 | 41·60 | 18·72 | +22·88 |
| *Cape—* | | | | | | | |
| Mafeking ... | J. Krept ... ... | 0·24 | 0·51 | —0·27 | 12·46 | 12·68 | —0·22 |
| Vryburg ... ... | J. T. Morrison ... | 0·00 | 0·68 | —0·68 | 12·12 | 18·83 | —6·71 |
| Griquatown ... | E. Hanstein ... | 0·32 | 0·89 | —0·57 | 11·60 | 9·74 | +1·86 |
| Prieska ... ... | M. Drummer ... | 0·13 | 0·62 | —0·49 | 7·40 | 7·18 | +0·22 |
| Fraserburg ... | P. J. Booysen ... | 0·00 | 0·67 | —0·67 | 6·93 | 4·55 | +2·38 |
| Clanwilliam ... | W. J. Downes ... | 1·06 | 1·51 | —0·45 | 1·59 | 3·09 | —1·50 |
| Calvinia ... ... | W. Harvey ... | 1·07 | 1·12 | —0·05 | 2·74 | 3·75 | —1·01 |
| Van Rhynsdorp ... | T. J. Shaw ... | 0·83 | 1·09 | —0·26 | 1·29 | 2·40 | —1·11 |
| Britstown ... | P. A. Myburgh ... | 0·00 | 0·80 | —0·80 | 7·76 | 7·27 | +0·49 |
| Carnarvon ... | J. Sullivan ... | 0·10 | 0·62 | —0·52 | 5·08 | 5·91 | —0·83 |
| Murraysburg ... | A. Cameron ... | 0·10 | 1·02 | —0·92 | 7·68 | 7·55 | +0·13 |
| Hanover ... ... | W. J. Myburgh ... | 0·14 | 1·10 | —0·96 | 7·01 | 9·56 | —2·55 |
| Aliwal North ... | A. Brown ... | 0·11 | 1·15 | —1·04 | 9·80 | 15·13 | —5·33 |
| Queenstown ... | H. Holley ... | 0·17 | 0·90 | —0·73 | 13·81 | 14·11 | —0·30 |
| Kokstad ... | H. D. Coyte ... | 1·12 | 1·00 | +0·12 | 18·70 | 14·32 | +4·38 |
| Philippstown ... | P. W. Tivzen-Kal | 0·00 | 1·08 | —1·08 | 7·65 | 9·23 | —1·58 |
| Worcester ... | W. B. Sutton ... | 1·07 | 1·46 | —0·39 | 2·19 | 3·75 | —1·56 |
| Capetown Observ. | The Staff... ... | 2·45 | 4·17 | —1·72 | 6·15 | 8·88 | —2·73 |
| Wynberg ... | Sister Mary Imelda | 5·71 | 6·50 | —0·79 | 10·27 | 12·33 | —2·06 |
| Swellendam ... | H. Montgomery... | 1·65 | 3·49 | —1·84 | 6·47 | 14·77 | —8·30 |
| Mossel Bay ... | G. Draper ... | 1·58 | 1·70 | —0·12 | 4·18 | 7·78 | —3·60 |
| Beaufort West ... | J. E. Stevens ... | 0·47 | 0·59 | —0·12 | 6·61 | 5·03 | +1·58 |
| Uniondale ... | E. J. Stewart ... | 1·27 | 1·53 | —0·26 | 6·94 | 6·08 | +0·86 |
| Kenhardt ... | A. E. Bowker ... | 0·00 | 0·35 | —0·35 | 1·45 | 4·01 | —2·56 |
| Graaff-Reinet ... | J. A. Simpson ... | 0·24 | 1·31 | —1·07 | 9·39 | 8·94 | +0·45 |
| Steytlerville ... | P. R. de Wet ... | 0·08 | 0·40 | —0·32 | 10·28 | 4·69 | +5·59 |
| Port Elizabeth ... | P. E. Morgan ... | 1·95 | 2·40 | —0·45 | 8·61 | 7·74 | +0·87 |
| Bedford ... | T. C. Hall ... | 0·53 | 1·50 | —0·97 | 14·47 | 14·54 | —0·07 |
| East London ... | Capt. M. C. Grogan | 3·96 | 1·88 | +2·08 | 19·46 | 11·38 | +7·08 |
| Hopetown ... | C. B. Scott ... | 0·07 | 0·91 | —0·84 | 6·91 | 9·05 | —2·14 |
| Amalienstein ... | Rev. Carl Projesky | 0·69 | 1·25 | —0·56 | 4·09 | 6·41 | —2·32 |
| Umtata ... ... | C. R. Hampson ... | 0·95 | 1·12 | —0·17 | 13·57 | 13·11 | +0·46 |
| *Orange Free State—* | | | | | | | |
| Bloemfontein ... | J. Arndt ... ... | 0·00 | 1·11 | —1·11 | 11·12 | 14·24 | —3·12 |
| Harrismith ... | J. B. Patterson ... | 0·50 | 0·98 | —0·48 | 12·14 | 15·62 | —3·48 |
| Lindley ... ... | Jno. Oates ... | 0·02 | 1·09 | —1·07 | 9·66 | 14·51 | —4·85 |


UNION OF SOUTH AFRICA
DISTRIBUTION OF RAINFALL
— May 1913. —
Nil to 0·10
0·11 " 0·50
0·51 " 1·00
1·01 " 2·00
2·01 " 3·00
3·01 " 4·00
Over 4·00

# South African Produce Markets.

## CAPETOWN.

The Produce Department of the firm of R. Müller, Capetown, reports under date of the 28th June, 1913, as follows :—

*Ostrich Feathers.*—Since reporting on the 29th ult. the London auction sales took place, at which Best Whites and Boos declined 10 per cent., whilst there was an advance in Feminas from 5 to 10 per cent.; for Drabs, Mediums and Shorts, 10 per cent. All other kinds remained unchanged or went a trifle higher.

Fairly large quantities of feathers changed hands in Capetown, both by public auction and out of hand. Prices realised were mostly very satisfactory as competiion continues good.

The prices ruling here now are as follows :—

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| Primes | 18 | 0 | 0 | to | 28 | 10 | 0 |
| First | 12 | 0 | 0 | „ | 16 | 10 | 0 |
| Second whites | 8 | 0 | 0 | „ | 11 | 10 | 0 |
| Third whites | 4 | 10 | 0 | „ | 7 | 10 | 0 |
| Inferior and stalky whites | 2 | 0 | 0 | „ | 4 | 10 | 0 |
| Byocks and fancy | 3 | 10 | 0 | „ | 11 | 0 | 0 |
| Superior feminas | 12 | 0 | 0 | „ | 16 | 0 | 0 |
| First feminas | 8 | 10 | 0 | „ | 11 | 10 | 0 |
| Second feminas | 5 | 0 | 0 | „ | 8 | 0 | 0 |
| Third feminas | 3 | 0 | 0 | „ | 4 | 10 | 0 |
| Greys | 3 | 10 | 0 | „ | 10 | 10 | 0 |
| White boos | 2 | 0 | 0 | „ | 3 | 0 | 0 |
| Light boos | 1 | 0 | 0 | „ | 2 | 0 | 0 |
| Dark boos | 0 | 5 | 0 | „ | 0 | 17 | 6 |
| Inferior boos and tipless | 0 | 6 | 0 | „ | 1 | 0 | 0 |

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| Long blacks | 3 | 0 | 0 | to | 6 | 0 | 0 |
| Medium blacks | 1 | 10 | 0 | „ | 2 | 10 | 0 |
| Short blacks | 0 | 5 | 0 | „ | 1 | 0 | 0 |
| Long floss blacks | 1 | 10 | 0 | „ | 2 | 0 | 0 |
| Medium floss blacks | 0 | 17 | 6 | „ | 1 | 10 | 0 |
| Short floss blacks | 0 | 5 | 0 | „ | 0 | 10 | 0 |
| Long drabs | 2 | 0 | 0 | „ | 3 | 0 | 0 |
| Medium drabs | 0 | 10 | 0 | „ | 2 | 0 | 0 |
| Short drabs | 0 | 2 | 6 | „ | 0 | 7 | 6 |
| Long floss drabs | 1 | 15 | 0 | „ | 2 | 5 | 0 |
| Medium floss drabs | 0 | 17 | 6 | „ | 1 | 10 | 0 |
| Short floss drabs | 0 | 5 | 0 | „ | 0 | 10 | 0 |
| Inferior long blacks and drabs | 0 | 15 | 0 | „ | 2 | 0 | 0 |
| Common blacks and drabs | 0 | 2 | 0 | „ | 0 | 5 | 0 |
| Spadonas | 1 | 0 | 0 | „ | 5 | 0 | 0 |

*Wool.*—On account of the winter season Capetown sales have been very small, and the following are the prices now ruling :—

| | d. | | d. |
|---|---|---|---|
| Calvinia, long | 7 | to | 8 |
| Calvinia, medium | 6 | „ | 7 |
| Karroo and Roggeveld | 6 | „ | 9½ |
| Short burry wools, heavy | 4 | „ | 4¾ |
| Short burry wools, light | 4¾ | to | 5½ |
| C. and C., best grease | 6 | „ | 6½ |
| C. and C., medium | 5 | „ | 6 |
| C. and C., inferior | 2 | „ | 4 |

*Skins.*—Towards the end of last month the public sales were held in London. Of goat skins 106,000 were sold out of 263,000 skins which were offered for sale. Whilst dry damaged skins remained unchanged, declines were experienced in other kinds as follows, viz. :—Heavy weights ½d., medium weights ¼d., light and extra light weights ½d. to ¾d., sundried and bastard ½d.

At the beginning of this month 397,000 Cape sheep skins were offered at the London sales, whereof 224,000 found buyers. The demand proved restricted on account of the stringency of the money market. Shorts and shorns remain unchanged in price, as the demand for the foreign trade was rather strong. Dry damaged were unchanged to ¼d. decline, coarse woolled skins fetched former prices, except for inferior sorts, which receded ⅛d. to ¼d. Clean combing and long woolled skins declined ⅛d. to ¼d. Of Glover's skins 117,000 were sold out of a total of 160,000 which were offered. There was a strong competition for these skins, of which prices advanced up to 1s. per dozen. The supply of lower qualities was very great, and for this reason priees declined 1s

The Capetown market continues to absorb all and any consignments at the following prices, which are altogether in seller's favour :—

| | |
|---|---|
| Goatskins, light | 12½d. per lb. |
| Goatskins, medium | 10½d. per lb. |
| Sundried and kids | 8d. per lb. |
| Angoras | 7d. per lb. |
| Angoras, bastard | 10d. per lb. |
| Angoras, shorn | 5½d. per lb. |

| | | | |
|---|---|---|---|
| Caledon .................... | 7d. per lb. | Capes, large ................ | 3s. 2d. each. |
| Longwools, Karroo .......... | 6½d. per lb. | Capes, medium ............. | 2s. 6d. each. |
| Shortwools ................. | 5¼d. per lb. | Capes, cut .................. | 1s. 6d. each. |
| Pelts and damaged .......... | 4½d. per lb. | Capes, damaged and lambs ... | 7d. each. |

*Hides.*—Since my last report the Capetown market has maintained its strong tone. Exporters are ready to take up any quantities, paying for sound hides 10d. per lb., and for damaged 7d. to 8d. per lb.

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## PORT ELIZABETH.

Messrs. John Daverin & Co. report as follows under date 28th June, 1913:—

*Ostrich Feathers.*—Three days' sale was held this week, the offerings consisting of an ordinary average assortment. The market was unsettled, but no change in prices can be quoted as compared with last week's rates, except possibly in the case of Spadonas, which are rather lower. In wings generally there is no change, the best sorts being still low, others remaining fairly steady. Blacks continue difficult of sale, but drabs are very firm at full prices, and tails are unchanged.

Supplies of new goods continue limited, and stocks are now rather lower. The value of feathers sold on our market this week amounted to £32,195. 12s. and weighed 11,146 lb. 11½ oz.

We quote the following as current prices for—

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| ***Primes:*** | | | | | | | |
| Extra super ...... | 22 | 10 | 0 | to | 35 | 0 | 0 |
| Good ............ | 16 | 0 | 0 | „ | 20 | 0 | 0 |
| ***Whites:*** | | | | | | | |
| Good to super ..... | 10 | 10 | 0 | „ | 15 | 0 | 0 |
| Good average ..... | 8 | 0 | 0 | „ | 9 | 0 | 0 |
| Average .......... | 6 | 0 | 0 | „ | 7 | 10 | 0 |
| Common and narrow | 3 | 10 | 0 | „ | 5 | 0 | 0 |
| Good broken ...... | 7 | 0 | 0 | „ | 10 | 0 | 0 |
| Thirds ........... | 2 | 5 | 0 | „ | 4 | 10 | 0 |
| ***Fancies:*** | | | | | | | |
| Good ............ | 6 | 10 | 0 | „ | 8 | 0 | 0 |
| Ordinary ......... | 4 | 0 | 0 | „ | 5 | 10 | 0 |
| ***Feminas:*** | | | | | | | |
| Super ............ | 11 | 0 | 0 | „ | 14 | 0 | 0 |
| Good average ..... | 7 | 0 | 0 | „ | 8 | 0 | 0 |
| Average .......... | 4 | 15 | 0 | „ | 6 | 0 | 0 |
| Common and narrow | 2 | 15 | 0 | „ | 3 | 15 | 0 |
| Good broken ...... | 5 | 10 | 0 | „ | 8 | 0 | 0 |
| Thirds ........... | 1 | 15 | 0 | „ | 2 | 15 | 0 |
| ***Greys:*** | | | | | | | |
| Good ............ | 5 | 15 | 0 | „ | 7 | 10 | 0 |
| Ordinary ......... | 3 | 10 | 0 | „ | 4 | 10 | 0 |
| ***Tails:*** | | | | | | | |
| Male, good, big, bold | 2 | 10 | 0 | „ | 3 | 5 | 0 |
| Male, good average | 1 | 15 | 0 | „ | 2 | 0 | 0 |
| Short and narrow .. | 0 | 15 | 0 | „ | 1 | 5 | 0 |
| Female, light, good, big, bold ....... | 1 | 15 | 0 | „ | 3 | 0 | 0 |
| Female, light, good average ........ | 1 | 10 | 0 | „ | 1 | 15 | 0 |
| Female, light, short and narrow ..... | 0 | 10 | 0 | „ | 0 | 15 | 0 |

| | £ | s. | d. | | £ | s. | d |
|---|---|---|---|---|---|---|---|
| *Tails*—(contd.): | | | | | | | |
| Female, dark, good, big, bold ....... | 1 | 0 | 0 | to | 1 | 15 | 0 |
| Female, dark, good average ......... | 0 | 15 | 0 | „ | 0 | 17 | 6 |
| Female, dark, short and narrow ...... | 0 | 7 | 6 | „ | 0 | 10 | 0 |
| ***Blacks:*** | | | | | | | |
| Long (special) ..... | 5 | 0 | 0 | „ | 7 | 0 | 0 |
| Long, good ........ | 3 | 10 | 0 | „ | 4 | 0 | 0 |
| Long, fair ......... | 2 | 0 | 0 | „ | 3 | 0 | 0 |
| Long, drabby ...... | 1 | 0 | 0 | „ | 2 | 5 | 0 |
| Medium ........... | 1 | 10 | 0 | „ | 2 | 10 | 0 |
| Short ............. | 0 | 10 | 0 | „ | 0 | 15 | 0 |
| Wiry .............. | 0 | 3 | 0 | „ | 0 | 6 | 0 |
| Floss, long ........ | 1 | 5 | 0 | „ | 1 | 15 | 0 |
| Floss, short ....... | 0 | 9 | 0 | „ | 0 | 14 | 0 |
| ***Drabs:*** | | | | | | | |
| Long, special ...... | 3 | 0 | 0 | „ | 4 | 5 | 0 |
| Long, good ........ | 2 | 0 | 0 | „ | 2 | 10 | 0 |
| Long, fair ......... | 1 | 5 | 0 | „ | 1 | 15 | 0 |
| Medium ........... | 0 | 17 | 6 | „ | 1 | 10 | 0 |
| Short ............. | 0 | 5 | 0 | „ | 0 | 12 | 6 |
| Wiry .............. | 0 | 2 | 0 | „ | 0 | 5 | 0 |
| Floss, long ........ | 1 | 5 | 0 | „ | 2 | 0 | 0 |
| Floss, short ....... | 0 | 9 | 0 | „ | 0 | 14 | 0 |
| ***Spadonas:*** | | | | | | | |
| Light (special) ..... | 4 | 0 | 0 | „ | 5 | 10 | 0 |
| Light, fair to good .. | 2 | 0 | 0 | „ | 3 | 5 | 0 |
| Light, narrow ...... | 0 | 17 | 6 | „ | 1 | 10 | 0 |
| Dark .............. | 1 | 0 | 0 | „ | 2 | 10 | 0 |
| ***Chicks*** ............. | 0 | 2 | 6 | „ | 0 | 7 | 6 |

The following may be quoted as the approximate current values of unsorted parcels per line:—

| | Whites. | | | | | | | Feminas. | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | £ | s. | d. | | £ | s. | d. | £ | s. | d. | | £ | s. | d. |
| Superior pluckings | 8 | 0 | 0 | to | 10 | 0 | 0 | 6 | 10 | 0 | to | 8 | 0 | 0 |
| Good average lots | 6 | 15 | 0 | „ | 7 | 10 | 0 | 5 | 0 | 0 | „ | 6 | 0 | 0 |
| Poor average lots | 5 | 5 | 0 | „ | 6 | 5 | 0 | 3 | 10 | 0 | „ | 4 | 5 | 0 |
| Common lots, stalky, narrow, and discoloured | 3 | 15 | 0 | „ | 4 | 15 | 0 | 2 | 10 | 0 | „ | 3 | 5 | 0 |

| | Tails. | | | | | Blacks. | | | | | Drabs. | | | | | Spadonas. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | s. | d. | | s. | d. | s. | d. | | s. | d. | s. | d. | | s. | d. | s. | d. | | s. | d. |
| Good | 25 | 0 | to | 35 | 0 | 20 | 0 | to | 40 | 0 | 17 | 6 | to | 30 | 0 | 50 | 0 | to | 70 | 0 |
| Average | 15 | 0 | „ | 20 | 0 | 12 | 6 | „ | 15 | 0 | 10 | 0 | „ | 12 | 6 | 30 | 0 | „ | 40 | 0 |
| Poor | 10 | 0 | „ | 15 | 0 | 8 | 0 | „ | 10 | 0 | 6 | 0 | „ | 7 | 6 | 20 | 0 | „ | 30 | 0 |

It will be understood that for special lots these quotations may be exceeded.

*Wool.*—Only small lots are coming to hand, which meet with ready sale at full prices. More interest is being shown in the heavier wools, and this class is gradually being reduced, and stocks here are about 2300 bales.

On the midday market on Thursday 159 bales were offered, of which 134 bales were sold. Wool in fairly light condition was well competed for, and heavy, wasty wools had more attention. Coarse and coloured and crossbreds are very firm.

The following is a summary of the wool sold:—

| | d. | d. |
|---|---|---|
| 6 bales light combing grease | 7⅞ | to 8 |
| 14 bales medium light grease | 7¼ | „ 7⅝ |
| 21 bales short light grease | 6⅝ | „ 7⅝ |
| 5 bales heavy combing | 5⅞ | |
| 46 bales good to super C. & C. | 6¼ | to 6¾ |
| 4 bales inferior | 5¾ | „ 6 |
| 14 bales good to super crossbred | 7¼ | „ 7⅝ |
| 5 bales inferior | 6¾ | „ 7 |

We quote the following as current prices:—

| | d. | d. |
|---|---|---|
| Snow-white, extra superior | 22 | to 23 |
| „ superior | 21 | „ 22 |
| „ good to superior | 20 | „ 21 |
| „ inferior faulty | 17 | „ 18½ |
| Grease, super long, well-conditioned, grassveld grown (special clips) | 10½ | „ 11½ |
| Grease, super long, grassveld grown | 9 | „ 9½ |
| Grease, super long, Karroo grown (special clips) | 9½ | „ 9½ |
| Grease, super long, Karroo grown | 7½ | „ 8¼ |
| Grease, super long, mixed veld | 7¼ | „ 7½ |
| Grease, light, faultless, medium, grassveld grown | 8 | „ 8½ |
| Grease, light, faultless, medium, Karroo grown | 7¼ | „ 8 |
| Grease, light, faultless, short, Karroo grown | 6½ | „ 7¼ |
| Grease, short, very wasty | 5 | to 5¾ |
| Cross-bred grease | 7¼ | „ 8 |
| Cross-bred scoured | 14 | „ 16 |
| Grease, coarse and coloured | 6¼ | „ 6¾ |
| Scoured, coarse and coloured | 9 | „ 14 |
| Basuto grease, short | 6¾ | „ 7 |
| O.F.S. grassveld grease, long and well-conditioned (special clips) | 8¼ | „ 8½ |
| O.F.S. grassveld grease, long and well-conditioned | 6½ | „ 7½ |
| O.F.S. grassveld grease, medium grown, light, with little fault | 6¼ | „ 7 |
| O.F.S. grassveld grease, short, faulty, and wasty | 5½ | „ 6¼ |
| O.F.S. Karroo grown, long and well-conditioned | 6¾ | „ 7½ |
| O.F.S. medium grown, light, with little fault | 6 | „ 7 |
| O.F.S. short, faulty, and wasty | 5 | „ 5½ |

***Mohair.***—There was a fairly active demand this week, and several hundred bales changed hands. The ordinary Bradford buyers still stand aloof; speculators continuing to support the market especially for superior clips, for which they pay very full prices. We had the pleasure of selling Messrs. G. H. Maasdorp & Sons' splendid clip during the week, and obtained extreme prices for the several qualities in it. On the public market on Tuesday 261 bales were offered, of which 169 bales were sold.

The following is a summary of the hair sold:—

| | d. | d. |
|---|---|---|
| 8 bales super summer firsts | 13¼ | to 13½ |
| 31 bales ordinary summer firsts | 12½ | „ 13 |
| 24 bales mixed Free State and back country—good | 12 | „ 12½ |
| 46 bales mixed Free State and back country—average | 11½ | „ 12 |
| 23 bales mixed Free State and back country—inferior | 10½ | to 11 |
| 6 bales mixed kids | 14¾ | „ 17¼ |
| 17 bales grey | 10¼ | „ 10¾ |
| 5 bales seconds | 7 | „ 9¼ |
| 7 bales locks | 6½ | „ 6¾ |

The following are current values of—

| | d. | | d. |
|---|---|---|---|
| Super summer kids | 25 | to | 26 |
| Good to super summer kids | 22 | „ | 24 |
| Mixed kids | 16 | „ | 20 |
| Super firsts | 13 | „ | 13½ |
| Mixed firsts | 12½ | „ | 12¾ |
| Superfine long blue O.F.S. hair | 12½ | „ | 13½ |
| Mixed O.F.S. mohair (average) | 11 | „ | 12 |
| Mixed O.F.S. mohair, very mixed | 10 | „ | 10½ |
| Seconds and grey | 8½ | to | 9½ |
| Thirds | 6 | „ | 7½ |
| Winter kids, special clips (nominal) | 14½ | „ | 16 |
| Winter kids, good ordinary (n'm'l) | 13½ | „ | 14 |
| Winter mohair (nominal) | 9¾ | „ | 10¾ |
| Basuto mohair | 10½ | „ | 11¾ |
| Basuto mohair, grey | 8 | „ | 9 |

*Skins.*—The following are the prices we obtained for the several descriptions this week:—Sheepskins, 6⅝d. per lb.; damaged, 5⅝d. per lb. Pelts, 4½d. per lb.; damaged, 3½d. per lb. Hair Capes, 2s. 11d. each; sundried, 1s. 11d. each; cut, 1s. each; damaged, 8d. each. Coarse wools, 6½d. per lb.; damaged, 3½d. per lb. Goat, 12¾d. per lb.; heavy, 10½d. per lb.; sundried, 10½d. per lb.; damaged, 6½d. per lb. Bastards, 11¼d. per lb.; damaged, 4¾d. per lb. Angora, 8½d. per lb.; sundried and heavy, 7½d. per lb.; shorn, 6½d. per lb.; damaged, 4d. per lb. Johannesburg sheep, 5d.; damaged sheep, 2½d. Pelts, 2¼d. Goat, 10d.; damaged, 5d. Angora, 6½d.; damaged, 2d. per lb.

*Hides.*—Sundried, 12¼d.; damaged, 11¼d.; salted, 11¼d.; damaged, 10¼d. per lb.

*Horns.*—3½d. each all round.

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## EAST LONDON.

The Produce Department of Messrs. Malcomess & Co., Ltd., write as follows under date 27th June, 1913:—

*Wool.*—Our last lines were dated the 29th May, and there is very little change to report from our market. The market has been cleared of a large proportion of the holdings, and the "off-season" has certainly commenced.

From Europe one hears that Bradford market stands at 29d. for Cape 60's, which is the same figure as a month ago.

In the Continental markets fair business is doing at steady unchanged rates.

London wool sales (the 4th series of the year) will open next Tuesday, the 1st prox., and the Antwerp sales news—the so-called barometer of London—has just come through as "par to 2½ per cent. lower compared with last Antwerp rates."

Unless there are further serious political complications, however, we do not think there will be any serious drop, though monetary stringency checks business somewhat.

Locally there have not been any auction sales this month, but a fair weight has been cleared privately, and the stocks can be placed at about 1500 bales wool consisting chiefly of heavy and undesirable long wools, together with a couple of hundred Basutos. Transactions for each week may be placed at about following figures:—

| | |
|---|---|
| Week ending 7th June | 1000 bales sold. |
| „ „ 14th „ | 1100 „ |
| „ „ 21st „ | 1200 „ |
| „ „ 28th „ | 700 „ |

Grand total about 4000 bales sold during the month.

Quotations are purely nominal, most sorts not being available:—

| | d. | | d. |
|---|---|---|---|
| Transkeis, good, clean, dry lots | 8 | to | 8½ |
| Transkeis, average lots | 7¼ | „ | 8 |
| Basutos, good to average lots | 6¼ | „ | 7⅛ |
| Super short Kaffrarian farmers' | 8 | „ | 10 |
| Super long Kaffrarian farmers' | 8 | „ | 10 |
| Super short well-conditioned grassveld | 6 | to | 9 |
| Super long well-conditioned grassveld | 6½ | „ | 9½ |
| Short faulty grease | 4½ | „ | 7¼ |
| C. and C. grease (good average) | 5½ | „ | 6¼ |
| „ „ (very kempy to inferior) | 3 | „ | 5 |

*Mohair.*—This market is absolutely lifeless; there are practically no stocks, and quotations again nominal :—

| | d. | | d. |
|---|---|---|---|
| Super long summer firsts | 12½ | to | 13¼ |
| Super short summer firsts | 12 | „ | 12½ |
| Super summer kids | 20 | „ | 25 |
| Average summer kids | 16 | „ | 20 |
| Sortings according to quality and length | 5½ | to | 7½ |
| Coloured hair, up to | | | 6½ |

*Sundry Produce.*—Cable news came through to-day reading :—

Hides and Angora skins........................Prospects are good.
Goats and sheep skins..........................Think present prices safe.

And we are able to quote :—

| | |
|---|---|
| Sundried hides | 12⅜d. |
| Dry-salted hides | 11⅜d. |
| Goatskins | 12d. |
| Bastards | 9½d. |
| Angora skins | 8d. to 8½d. |
| Damaged | 5d. each. |
| Sheepskins—1st quality | 6¼d. |
| „ C. and C. skins | 5½d. |
| „ Do. including Capes | 6d. |
| „ Pelts | 4¼d. |
| „ Transkeis | 5d. |
| Horns, according to quality and size (each) | 2d. to 3d. |

## DURBAN.

Messrs. Reid & Acutt's Wool Mart, Ltd., Esplanade, Durban, report as follows under date 30th June, 1913 :—

*Wool.*—The season is now completely over, and there has been little or nothing doing in wool circles during the month just closed. Offerings on the local auctions have not totalled more than one to two hundred bales per week, but we are pleased to say that the small quantities catalogued have invariably met with a keen demand, and have changed hands at fully maintained rates.

A recent cable advice from Bradford reads as follows :—"Both super and common 60's have declined fractionally, but I believe that so far as merinos are concerned the future is fairly reassuring. I think the market at the next London sales (July series) will be firm both for merinos and crossbreds. I do not think it probable that prices will go upwards, though I do not expect any serious decline. *Mohair.*—Spinners are busy, and consumption is large. Cape firsts of good fine character are worth here 1s. 2d. to 1s. 2¼d. per lb.; Cape kids are worth here 2s. 4d. to 2s. 5d.; the outlook is healthy."

The next series of London public auctions is due to open there to-morrow (1st prox.), and we have just received cable advice that prices are expected to be well maintained.

*Coarse and Coloured.*—This remains in strong demand at prices fully up to those quoted below.

*Mohair.*—This market continues quite brisk with an active inquiry, all lots offered being saleable at satisfactory prices.

The following are prices current here to-day :—

### NATAL AND EAST GRIQUALAND.

*Midlands.*

| | d. | | d. | |
|---|---|---|---|---|
| Sorted clips, light and clean | 10 | to | 12 | Nominal. |
| Unsorted clips, light and clean | 9 | „ | 10½ | |
| Short to medium lambs | 7½ | „ | 8½ | |
| Medium to long lambs | 8½ | „ | 10 | |

*Utrecht and Vryheid.*

| | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 8½ | to | 9¼ |
| 12 months' average clips, light and clean | 7¼ | „ | 7¾ |
| 6 to 9 months average | 6½ | „ | 7½ |
| Short to medium lambs | 7 | „ | 8½ |
| Medium to long lambs | 8¼ | „ | 9¼ |

*Ladysmith, Newcastle, Dundee, etc.*

| | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 9 | to | 10 |
| 12 months' average clips, light and clean | 7½ | „ | 8½ |
| 6 to 9 months average | 6½ | „ | 7¼ |
| Short to medium lambs | 7¼ | „ | 8¾ |
| Medium to long lambs | 8½ | „ | 9½ |

*East Griqualand.*

| | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 8¾ | to | 9¼ |
| 12 months' average clips, light and clean | 7¼ | „ | 7¾ |
| 6 to 9 months light and clean | 6¼ | „ | 7 |
| Short to medium lambs | 6¾ | „ | 7¾ |
| Medium to long lambs | 7¾ | „ | 8½ |

## TRANSVAAL.

*Volksrust, Wakkerstroom, Ermelo, Amersfoort, etc.*

| | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 9 | to | 10 |
| 12 months' average clips, light and clean | 7¾ | „ | 8¾ |
| 6 to 9 months average | 6½ | „ | 7¾ |
| Short to medium lambs | 7¼ | „ | 8½ |
| Medium to long lambs | 8 | „ | 9¼ |

*Standerton, Bethal, Middelburg, etc.*

| | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 8 | to | 9 |
| 12 months' average clips, light and clean | 7 | „ | 7¾ |
| 6 to 9 months average | 6 | to | 7 |
| Short to medium lambs | 6¼ | „ | 7½ |
| Medium to long lambs | 7¼ | „ | 8 |

*Heidelberg, Pretoria, Potchefstroom, Klerksdorp, Lichtenburg, etc.*

| | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 7½ | to | 8¼ |
| 12 months' average clips, light and clean | 6½ | „ | 7¼ |
| 6 to 9 months average | 6 | „ | 6¾ |
| Short to medium lambs | 5¾ | „ | 7 |
| Medium to long lambs | 6¾ | „ | 7½ |

## ORANGE FREE STATE.

*Harrismith, Vrede, Bethlehem, Heilbron, etc.*

| | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 8 | to | 9¼ |
| 12 months' average clips, light and clean | 7¼ | „ | 8 |
| 6 to 9 months average | 6¼ | „ | 7¼ |
| Short to medium lambs | 6½ | „ | 7¾ |
| Medium to long lambs | 7¾ | „ | 8¾ |

*Lindley, Kroonstad, Vredefort, Parys, etc.*

| | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 7¾ | to | 8¾ |
| 12 months' average clips, light and clean | 7 | „ | 7½ |
| 6 to 9 months average | 6 | „ | 6¾ |
| Short to medium lambs | 6½ | „ | 7½ |
| Medium to long lambs | 7½ | „ | 8¼ |

*Senekal, Ficksburg, Ladybrand, Winburg, etc.*

| | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 7¾ | to | 8½ |
| 12 months' average clips, light and clean | 6¾ | „ | 7¼ |
| 6 to 9 months average | 5¾ | „ | 6½ |
| Short to medium lambs | 6¼ | „ | 7¼ |
| Medium to long lambs | 7 | „ | 8 |

*Coarse and Coloured.*

| | d. | | d. |
|---|---|---|---|
| Free from kemps | 5¾ | to | 6½ |
| Ordinary | 4½ | „ | 5½ |
| Inferior, kempy, and Persian | 2 | „ | 3½ |

## BASUTOLAND AND NATIVE WOOLS.

| | d. | | d. |
|---|---|---|---|
| Superior lots, light and clean | 6¼ | to | 7 |
| Average lots, light and clean | 5½ | „ | 6¼ |
| Average lots, heavy and wasty | 5 | „ | 5½ |
| Transkei, good | 7 | to | 8¼ |
| Transkei, ordinary | 6 | „ | 7 |

## MOHAIR.

| | d. | | d. |
|---|---|---|---|
| Kids, good length and super quality | 13 | to | 18 |
| Long blue, super quality | 12 | „ | 13 |
| Long blue, average | 11 | „ | 12 |
| Good winter | 9½ | to | 10½ |
| Short and mixed winter | 8½ | „ | 9½ |
| Inferior and coloured | 3 | „ | 6 |

## BASUTOLAND AND NATIVE MOHAIR.

| | d. | | d. |
|---|---|---|---|
| Good length and quality | 11 | to | 12 |
| Average lots | 10 | „ | 11 |
| Inferior and short mixed | 6 | to | 8 |

## HIDES, SKINS, HORNS, ETC.

All descriptions are in good demand at our quotations as follows :—

*Hides.*—Sundried, 14 to 20 lb. average, 10½d. to 12½d. per lb.; sundried, inferior, 8d. to 9d.; salted, 8½d. to 10d.

*Sheepskins.*—Long-woolled, 5½d. to 6½d. per lb.; short-woolled, 3½d. to 4½d; pelts, 1½d. to 3d.; coarse and coloured, 3d. to 5d.; salted, heavy, 4d. to 5½d.

*Goatskins.*—Mixed parcels, sound, 4d. to 6½d. per lb.; inferior, 2d. to 3d.

*Horns.*—3d. to 12d. per pair.

*Wattle Bark.*—Cut and bagged, good colour and quality, 4s. to 4s. 9d. per cwt.; cut and bagged, inferior colour and quality, 2s. 6d. to 4s. per cwt.: uncut in bundles, good colour and quality, 2s. to 3s. per cwt.; uncut in bundles, inferior, 1s. 6d. to 2s. per cwt.

### OSTRICH FEATHERS.

During the month we held very successful sales, the offerings being large and of good quality. Many buyers were present and competition was keen, except for short goods, which were rather week and neglected. Primes realized up to £24 per lb.

We quote :—

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| Primes............. | 10 | 0 | 0 | to | 24 | 0 | 0 |
| Whites............. | 5 | 0 | 0 | „ | 9 | 0 | 0 |
| Feminas ........... | 3 | 0 | 0 | „ | 4 | 10 | 0 |
| Inferior, stalky and broken........... | 1 | 10 | 0 | „ | 3 | 0 | 0 |
| Byocks ............ | 1 | 5 | 0 | „ | 4 | 2 | 6 |
| Blacks, long ........ | 2 | 0 | 0 | „ | 3 | 5 | 0 |
| Blacks, medium..... | 1 | 0 | 0 | „ | 2 | 5 | 0 |
| Blacks, short........ | 0 | 5 | 0 | „ | 0 | 15 | 0 |

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| Drabs, long......... | 0 | 15 | 0 | to | 1 | 10 | 0 |
| Drabs, medium...... | 0 | 10 | 0 | „ | 0 | 15 | 0 |
| Drabs, short ........ | 0 | 5 | 0 | „ | 0 | 10 | 0 |
| White tails......... | 1 | 0 | 0 | „ | 1 | 10 | 0 |
| Light tails ......... | 0 | 5 | 0 | „ | 0 | 10 | 0 |
| Dark tails.......... | 0 | 2 | 6 | „ | 0 | 6 | 6 |
| Spadonas........... | 0 | 15 | 0 | „ | 1 | 0 | 0 |
| Chicks............. | 0 | 1 | 6 | „ | 0 | 3 | 6 |

# Importation of Live Stock.

RETURN showing particulars of certain Pure-Bred Live Stock recently imported into the Union of South Africa.

| Stud-book No. or Name. | Breed and Stud-book in which Registered. | Sex. | Country of Origin. | Importer's Name and Address. |
|---|---|---|---|---|
| HORSES: | | | | |
| "Morston Don." No. 3766 | Suffolk Punch.—Suffolk Horse Soc. | Stallion | England | Major K. P. Apthorp, Westminster, O.F.S. |
| No particulars ... | Thoroughbred—English Stud-book, vol. 22 | Colt | U.K. | A. Welch, Harrismith O.F.S. (20/5/13). |
| "Pomona" ... ... | Hunter.—Hunters' Stud-book, vol. 6 | Mare | " | Cyril S. Rich, Kroonstad, O.F.S. |
| CATTLE: | | | | |
| "Spring Flower" ... | Lincoln Red.—Lincoln Red Shorthorn Associat. Herd-book | Cow | England | Transvaal Estates and Development Co., Ltd., Box 1153, Johannesburg (26/5/13). |
| "Pendley Gift" ... | " (vol. 18) | " | " | " " |
| "Pendley Skipworth V" | " " | " | " | " " |
| "Pendley Lassie IV" | " " | " | " | " " |
| "Dunsby Red XIV" | " (vol. 19) | Bull | " | " " |
| "Burton Rischolme Lass" | " — | Heifer | " | Trollip, Witmos, Cape (14/5/13). |
| "Burton Horkstow Lady I" | " — | " | " | " " |
| "Deepden Rose" ... | " (vol. 18) | " | U.K. | Hon. Jos. Baynes, Nels Rust, Natal. |
| "Deepden Maid" ... | " " | " | " | " " |
| "Deepden Cowslip" | " " | " | " | " " |
| "Deepden Tulip" ... | " " | " | " | " " |
| "Terling Marie VI," No. 3592 | British Holstein.—Br. Holstein Cattle Soc. Herd-book, vol. 2 | Cow | England | Transvaal Estates and Development Co., Ltd. (28/5/13). |
| "Terling Jorst II," No. 3582 | " " | " | " | " " |
| "Garton Sweet" ... | " " | " | " | " " |
| "Terling Clara III," No. 3579 | " " | " | " | " " |
| "Garton Beatrice" | " " | " | " | " " |
| "Terling Tulip II," No. 3652 | " " | " | " | " " |
| "Terling Rosedrop II," No. 3642 | " " | " | " | " " |
| "Terling Pheasant V," No. 3643 | " " | " | " | " " |
| "Hedges Sensation" | " " | " | " | " " |
| "Hedges Speculator" | " " | " | " | " " |
| "Terling Adler III" | British Holstein.—Br. Holstein Cattle Soc. Stud-book | Heifer | " | A. A. Kingwell, Colonies Plaats, Graaff-Reinet (14/5/13). |
| "Terling Ivory IV" | " " | " | " | " " |

| Stud-book No. or Name. | Breed and Stud-book in which Registered. | Sex. | Country of Origin. | Importer's Name and Address. |
|---|---|---|---|---|
| CATTLE (*continued*): | | | | |
| "Highfield Admiral," No. 7395 | Devon. — Devon Herd-book | Bull | England | Transvaal Estates and Development Co., Ltd. (26/5/13). |
| "Highland Monarch IV" | " (vol. 36) | " | " | A. E. Philip, Philipdale, Albert (14/5/13). |
| "Primley Explorer" | South Devon.—South Devon Herd-book (Suppt. to vol. 13) | " | U.K. | C. W. van der Merwe, Lady Grey (7/5/13). |
| "Primley Ferdinand" | " " | " | " | " " |
| No particulars ... | South Devon.—(No particulars) | " | England | Wm. Cooper & Nephews, Gonubie Park, East London (8/5/13). |
| " | " " | " | " | " " |
| " | South Devon.—South Devon Herd-book, vol. No. XII., p. 173 | Heifer | U.K. | Col. E. M. Greene, Nottingham Road, Natal. |
| " | South Devon.—South Devon Herd-book, vol. No. XI, p. 93 | Cow | " | " " |
| "Shraden Cadet," No. 3899 | Hereford.—Hereford Herd-book, vol. 44 | Bull | England | Transvaal Estates and Development Co., Ltd. (26/5/12). |
| "Montford Agent," No. 3900 | " " | " | " | " " |
| "Village Swain," No. 113648 | Coates' Shorthorn.—Coates' Herd-book, vol. 58 | " | " | H. J. Coetzee, Doornkloof, Somerset East (14/5/13). |
| "Filkins XVII" ... | " (vol. 59) | Heifer | " | " " |
| "Heatherbell XXIV" | " " | " | " | " " |
| No particulars ... | " " | Bull | U.K. | S. A. Wattles, Ltd., Bethal. |
| " | " " | " | " | " " |
| " | " " | Heifer | " | " " |
| " | " " | " | " | " " |
| " | Ayrshire.—Ayrshire Herd-book | Bull | " | J. Pope Ellis, Umlaas Road, Natal. |
| " | " " | " | " | " " |
| "Castlelough Kitty," No. 3623 | Kerry.—Kerry and Dexter Herd-book, vol. No. XV, p. 17 | Cow | Ireland | J. R. Land, Kingwilliamstown (8/5/13). |
| "Jan III," 6001 ... | Friesland.—(No particulars) | Bull | Holland | J. W. Moor, Hartford, Mooi River, Natal (20/5/13). |
| "Willem II," No. F4497/M14328 | " " | " | " | " " |
| "Zwarte Dina," No. F4198/M13226 | " " | Cow | " | " " |
| "Aitje LVIII," No. F4036/M1464 | " " | " | " | " " |
| "Jozef," No. 150 ... | Groningen " | Bull | " | R. S. Sitwell, Kroonstad (20/5/13). |
| "Lord," No. 149 ... | " " | " | " | " " |
| S. No. 545/24 ... | Friesland.—Friesch Rundvee Stamboek | " | " | Hon. A. Cliff, J.P., Harrismith (15/5/13). |
| N/R. No. 119/278 ... | " " | " | " | " " |
| No. 5868 ... ... | " " | " | " | " " |

| Stud-book No. or Name. | Breed and Stud-book in which Registered. | Sex. | Country of Origin. | Importer's Name and Address. |
|---|---|---|---|---|
| CATTLE (*continued*) : | | | | |
| No. 6095 ... ... | Friesland.—Friesch Rundvee Stamboek | Bull | Holland | Hon. A. Cliff, J.P., Harrismith (15/5/13). |
| S. No. 20/1210 ... | " " | Cow | " | " " |
| S. No. 20/1087 ... | " " | " | " | " " |
| S. No. 20/1082 ... | " " | " | " | " " |
| S. No. 20/1221 ... | " " | " | " | " " |
| H. No. 172/46 ... | " " | " | " | " " |
| K/M. No. 332/F ... | " " | " | " | " " |
| N/R No. 228/185 ... | " " | " | " | " " |
| Fv/Z. No. 271/21 ... | " " | " | " | " " |
| K/M. No. 114/80 ... | " " | " | " | " " |
| Jv/Z. No. 30/234 ... | " " | " | " | " " |
| K/M. No. 96/562 ... | " " | " | " | " " |
| K/M. No. 96/564 ... | " " | " | " | " " |
| K/M. No. 95/542 ... | " " | " | " | " " |
| T/F. No. 263/55 ... | " " | " | " | " " |
| AC/T. No. 183/261... | " " | " | " | " " |
| K/M. No. 96/551 ... | " " | " | " | " " |
| K/M. No. 95/538 ... | " " | " | " | " " |
| K/M. No. 96/565 ... | " " | " | " | " " |
| P/J. No. 155/68 ... | " " | " | " | " " |
| AC/F. No. 183/254... | " " | " | " | " " |
| SHEEP : | | | | |
| "Bran Mash," No. 12819 | Suffolk.—Suffolk Sheep Soc. | Ram | England | Major K. P. Apthorp, Westminster, O.F.S. |
| "Bran Pie," No. 11656 | " " | " | " | " " |

# Outbreaks of Animal Diseases.

THE following outbreaks of scheduled infectious and contagious animal diseases have occurred in the areas specified during the month ended 30th June, 1913.

C. E. GRAY,
*Principal Veterinary Surgeon (Union).*

## CAPE PROVINCE PROPER.

(EXCLUDING TRANSKEIAN TERRITORIES.)

| Disease. | District. | Area or Name of Farm. | Number of Deaths. | Number of Animals Affected. | Number of In-contacts. | Number of Animals Tested. | Number of Animals Reacted and Destroyed. | Number of Doubtful Reactors to be Retested. |
|---|---|---|---|---|---|---|---|---|
| Anthrax ... | Barkly West ... | Zoetluintjes Location, Boetsap ... ... ... ... | 1 | — | Unkn. | — | — | — |
| | Hay ... ... | Klipputs, Griquatown ... ... ... ... ... | 2 | — | ,, | — | — | — |
| | Herbert ... ... | Middledrift... ... ... ... ... ... ... | 1 | — | 61 | — | — | — |
| | ,, ... ... | "The Hoek" of Goedmansdrift ... ... ... ... | 8 | — | 50 | — | — | — |
| | Herschel ... ... | R. Molale's Location ... ... ... ... ... | 1 | — | Unkn. | — | — | — |
| | Knysna ... ... | Quarrywood ... ... ... ... ... ... | 1 | — | ,, | — | — | — |
| | Komgha ... ... | Lot 42 xiii/26 ... ... ... ... ... ... | 1 | — | 61 | — | — | — |
| | ,, ... ... | Lot 50 xiii/26 ... ... ... ... ... ... | 1 | — | 31 | — | — | — |
| | ,, ... ... | Farm 247 ... ... ... ... ... ... ... | 1 | — | 36 | — | — | — |
| | ,, .. ... | Farm 230 B. ... ... ... ... ... ... | 1 | — | 55 | — | — | — |
| | Mafeking ... ... | Farm Buckreef ... ... ... ... ... ... | 1 | — | 316 | — | — | — |
| East Coast Fever | East London ... | Lots 8, 9, and 10 (Gonubie Bridge) ... ... ... | 1 | — | 166 | — | — | — |
| Farcy ... ... | Peddie ... ... | Lot 3, Begha ... ... ... ... ... ... | 1 affect. & destrd. | — | Nil | — | — | — |
| Scabies (Equine) | Alexandria ... ... | Village ... ... ... ... ... ... ... ... | — | 1 | — | — | — | — |
| | Caledon ... ... | ,, ... ... ... ... ... ... ... | — | 2 | — | — | — | — |
| | Knysna ... ... | West Ford ... ... ... ... ... ... ... | — | 4 | — | — | — | — |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Scabies (Equine) | Port Elizabeth ... | Korston ... | — | 2 | — | — | | - |
| | " ... | Doyle Street | — | 2 | - | - | | - |
| | Uitenhage ... ... | Kleinpoort ... | — | 1 | | - | | — |
| Tuberculosis ... | Cape ... ... | Various ... | - | — | — | 205 | 9 | — |
| | Malmesbury ... | " ... | — | — | — | 54 | Nil | Nil |
| | Paarl ... ... | " ... | — | — | — | 6 | Nil | Nil |
| | Stellenbosch ... | " ... | — | — | — | 98 | 3 | 1 |

Districts of the Cape Province in which East Coast Fever is prevalent :—East London, Kingwilliamstown, and Komgha.

## NATAL.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| East Coast Fever | Alexandra Division | Isizela Estate ... | — | — | — | — | — | — |
| | Bergville " ... | Howie ... | 22 | — | 267 | — | — | — |
| | " " ... | Waai Hoek ... | — | — | — | — | — | — |
| | Estcourt " ... | Springfontein ... | — | — | — | — | — | — |
| | Impendhle " ... | The Glen ... | 2 | — | 67 | — | - | — |
| | " " ... | Carmel ... | 4 | — | 67 | — | — | — |
| | Ixopo " ... | Klip Gat ... | — | — | — | — | — | — |
| | " " ... | Sunrise ... | — | — | — | — | — | — |
| | Lions River " ... | Halliwell ... | — | — | — | — | - | - |
| | New Hanover Division | Doorn Kop ... | — | — | — | — | — | — |
| | Ngotshe Division ... | Paradys ... | — | — | — | — | - | — |
| | Paulpietersburg Division | Tiverton ... | 2 | - | 23 | — | - | — |
| | Zululand ... ... | Melmoth Town Lands ... | 5 | — | 528 | — | — | — |
| | " | Eshowe Town Lands ... | 20 | — | 546 | — | - | — |
| Anthrax ... | Pietermaritzburg ... | The Cloisters ... | 1 | — | 4 | — | — | — |
| | Dundee Division ... | Craigieburn ... | 1 | — | — | — | | — |
| | Lions River Division | Riet Vallie ... | 1 | — | — | - | | - |

*Note* re *East Coast Fever infection in Natal* :—With the exception of Lower Tugela, every Magisterial Division in Natal is infected with East Coast Fever.

TRANSVAAL.

| DISEASE. | DISTRICT. | AREA OR NAME OF FARM. | Number of Deaths. | Number of Animals Affected. | Number of In-contacts. | Number of Animals Tested. | Number of Animals Reacted and Destroyed. | Number of Doubtful Reactors to be Retested. |
|---|---|---|---|---|---|---|---|---|
| East Coast Fever | Zoutpansberg ... | Calais No. 156 ... ... ... ... ... ... | Not | known. | | | | |
| Glanders ... | Witwatersrand ... | Driefontein No. 3 ... ... ... ... ... ... | — | — | 9 | 9 | 1 | — |
| | „ ... | Brixton ... ... ... ... ... ... ... | — | — | 38 | 38 | 1 | — |
| Anthrax ... | Potchefstroom ... | Koedoesfontein No. 12 ... ... ... ... .. | 1 | — | 60 | — | — | — |
| | Krugersdorp ... | Roodepoort No. 49 ... ... ... ... ... | 1 | — | 133 | — | — | — |
| | Marico ... ... | Palmietfontein ... ... ... ... ... ... | 1 | — | 70 | — | — | — |
| | Witwatersrand ... | Modderfontein No. 17 ... .. ... .. . | 1 | — | 13 | — | — | — |
| | „ ... | Witpoortje ... ... ... ... ... ... ... | 1 | — | 17 | — | — | — |
| | „ ... | Germiston ... ... ... ... ... ... ... | 1 | — | 75 | — | — | — |
| | „ ... | Brakpan No. 16 ... .. ... ... ... ... | 1 | — | 17 | — | — | — |
| | „ ... | Kleinfontein No. 9 ... ... ... ... ... | 1 | — | 30 | — | — | — |
| | „ ... | Rietfontein No. 11 ... ... .. ... ... | 1 | — | 50 | — | — | — |
| | „ ... | Brakpan No. 16 ... ... ... ... .. ... | 1 | — | 21 | — | — | — |
| | Pretoria ... ... | Klipfontein No. 88 ... ... ... ... ... | 1 | — | 10 | — | — | — |
| | Potchefstroom ... | Hartebeestfontein No. 624 ... ... ... .. | 1 | — | 15 | — | — | — |
| | Marico ... ... | Linokana ... ... ... ... ... .. ... | 1 | — | 25 | — | — | — |
| | „ ... ... | „ ... ... .. ... ... .. ... | 1 | — | 16 | — | — | — |
| | Krugersdorp ... | Roodepoort No. 43 ... .. ... ... ... | 1 | — | 12 | — | — | — |
| | „ ... | Roodepoort ... ... ... ... ... ... | 1 | — | 5 | — | — | — |
| Lung-sickness ... | Rustenburg... ... | Middelfontein No. 662 ... ... ... ... ... | — | — | 199 | 199 | 5 | — |
| | „ ... | Waterval No. 544 ... ... ... ... .. ... | — | — | 76 | 76 | 1 | — |
| Tuberculosis ... | Standerton ... ... | Van Niekerksvlei ... ... ... ... ... . | — | — | — | — | — | — |
| „ (Pigs) | Ermelo ... ... | Lang en Smal ... ... ... ... ... . | 30 | — | 15 | — | — | — |
| Contagious Abortion | Rustenburg... ... | Onderstepoort No. 421 ... ... ... ... ... | 23 | — | 574 | — | — | — |
| Swine Fever ... | Witwatersrand ... | Mooifontein No. 14 ... ... ... ... ... | 120 | 14 | 60 | — | — | — |

Districts in Transvaal in which East Coast Fever is prevalent :—Zoutpansberg, Carolina, Barberton, Piet Retief, Rustenburg, Lydenburg, and Pretoria.

ORANGE FREE STATE.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Tuberculosis ... (Imported | Thaba 'Nchu ... Cattle Test) | Branksome ... ... ... ... ... ... | — | — | — | 65 | 1 | — |

TRANSKEI.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| East Coast Fever | Tabankulu ... ... | Mkulukenis and Tshikitshwas Locations ... ... | — | — | — | — | — | — |
| | Nqamakwe... ... | Village Reserve and Pekos Location ... ... ... | — | — | — | — | — | — |
| | Umzimkulu ... | Waterfall ... ... ... ... ... ... ... | 1 | — | 30 | — | — | — |
| | " ... ... | Riverside ... ... .. ... ... ... ... | 3 | — | 153 | — | — | — |
| | Mount Frere ... | Whindus Location... ... ... ... ... ... | 9 | — | 216 | — | — | — |
| | " ... | Tsibeyane's Location ... ... ... ... ... | 6 | — | 15 | — | — | — |
| | " ... | Jonas Dubule's Location ... ... ... ... ... | 27 | — | 101 | — | — | — |
| | " ... | Walker's Location... ... ... ... ... ... | 2 | — | 518 | — | — | — |
| | " ... | Ntsoyana's Location ... ... ... ... ... | 1 | — | 11 | — | — | — |
| | Qumbu ... ... | Ntabanduli Store, Mbeyana's, Maquba's, and Tyera's Locations, Tonjeni's Location, Ngikclane's Location | — | — | — | — | — | — |
| | St. Marks ... ... | Manzamdaka's and Zolomisa's Location ... ... | 28 | — | — | — | — | — |
| | Kentani ... ... | Trow's Farm ... ... ... ... ... ... ... | 15 | — | 500 | — | — | — |
| | " | Gayo's Location ... ... ... ... ... ... ... | — | — | — | — | — | — |
| | Tsolo ... ... | Council Farm ... ... ... ... ... ... ... | 3 | — | 283 | — | — | — |
| | " | Tsalumoya's Location ... ... ... ... ... ... | 43 | — | 393 | — | — | — |
| | " | Jamangile's Location ... ... ... ... | 5 | — | 142 | — | — | — |
| Lung-sickness ... | Umtata ... ... | Sakela's Location ... ... ... ... ... ... ... | 1 | — | 74 | 74 | 8 | — |
| | Libode ... ... | Gingas Location ... ... ... ... ... ... ... | 1 | — | 118 | 118 | 2 | — |
| Anthrax ... | " | Harry Ebden ... ... ... ... ... ... ... | 2 | — | 150 | — | — | — |
| | Kentani ... ... | Golongo's Store, Velebayi's, Dalveni's, Nzimavuta's, Nthlangeni's, Ngungani's, Botman's, Dixon's, and Feni's Locations | — | — | — | — | — | — |
| | Nqamakwe... ... | Peko's. Nofotyo's, Nobanba's, Bangeni's, and Mavuso's Locations | — | — | — | — | — | — |
| Glanders ... | Tabankulu ... ... | Tabankulu Village ... ... ... ... ... ... | 3 | — | 11 | 11 | 1 | — |
| | Port St. John ... | Port St. John Commonage ... ... ... ... ... | — | — | 30 | 30 | — | — |

Districts free from East Coast Fever in Transkei are as follows :—Tsomo, Xalanga, Mount Fletcher, Matatiele.

# Current Market Rates of Agricultural Produce and Stock.

The following TABLE OF CURRENT MARKET RATES OF AGRICULTURAL PRODUCE AND LIVE STOCK on Saturday, 28th June, 1913, ruling at the several Centres named, is published for general information.

| Centre. | A. Wheat per 100 lb. | B. Wheat Flour per 100 lb. | C. Boer Meal per 100 lb. | D. Mealies per 100 lb. | E. Mealie Meal per 100 lb. | F. Barley per 100 lb. | G. Oats per 100 lb. | H. Oat-hay per 100 lb. | J. Lucerne Hay per 100 lb. | K. Potatoes per 100 lb. | L. Tobacco (Boer Roll) per lb. | M. Beef per lb. | N. Mutton per lb. | O. Fresh Butter per lb. | P. Eggs per dozen. | Q. Cattle (Slaughter). | R. Sheep (Slaughter). | S. Pigs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | £* s. d. | s. d. | £ s. d. |
| *Cape Province:* | | | | | | | | | | | | | | | | | | |
| Aliwal North ... | 14 0 | 22 6 | 16 6 | 9 6 | 11 6 | 11 0 | 11 0 | 7 6 | — | 9 0 | 0 10 | 0 6 | 0 6 | 1 9 | 2 3 | 10 15 0 | †15 6 | ‡1 15 0 |
| Beaufort West ... | 13 0 | 19 0 | 13 6 | 8 9 | 13 6 | 11 0 | 8 3 | 4 6 | 5 0 | 10 6 | 1 0 | 0 5 | §0 4 | 1 3 | 2 0 | 13 0 0 | 12 0 | 5 0 0 |
| Capetown ... | 7 6 | — | — | — | — | 8 6 | 6 6 | 4 0 | 4 0 | 12 0 | ‖0 5 | — | — | 1 3 | 1 10 | — | — | — |
| East London ... | 9 6 | 18 0 | 29 0 | 8 0 | 15 0 | 7 0 | 9 0 | 6 6 | 6 0 | 12 6 | 1 0 | 0 4 | 0 6 | 2 0 | 1 8 | 12 0 0 | 17 6 | 1 8 0 |
| Grahamstown ... | 11 6 | — | — | 8 0 | — | 7 3 | 6 9 | 7 0 | — | 10 6 | 0 8 | 0 6 | 0 $6\frac{1}{4}$ | 1 $6\frac{1}{2}$ | 1 $8\frac{1}{2}$ | — | — | 3 5 0 |
| Kimberley ... | 12 0 | 16 0 | 15 0 | 6 6 | 8 0 | 9 0 | 7 0 | 5 3 | 7 0 | 12 0 | 0 5 | 0 6 | 0 5 | 1 3 | 2 0 | 12 10 0 | 14 0 | $4\frac{1}{2}$d. p. lb. |
| Kingwilliamstown | 12 6 | 17 9 | 14 6 | 6 3 | 7 0 | 9 3 | 9 0 | 6 6 | 6 0 | 11 0 | 0 8 | 0 6 | 0 6 | 1 9 | 1 4 | 13 10 0 | 16 6 | 3d. p. lb. |
| Port Elizabeth ... | 10 0 | — | — | 7 6 | — | 7 0 | 7 6 | 6 9 | — | 12 0 | — | 0 7 | 0 7 | 1 8 | 2 0 | — | — | 2 10 0 |
| Queenstown ... | 11 6 | 16 6 | 13 6 | 8 0 | 12 0 | — | 9 6 | — | 6 0 | 10 0 | 0 10 | — | 0 4 | 1 4 | 2 0 | — | — | — |
| *Natal:* | | | | | | | | | | | | | | | | | | |
| Durban ... | — | — | — | 7 6 | — | — | — | — | — | 12 0 | — | — | — | 1 5 | 2 0 | — | — | — |
| Pietermaritzburg | 12 0 | — | — | 5 6 | — | 12 0 | 9 0 | 7 0 | 4 0 | 11 0 | 0 4 | 0 $5\frac{1}{2}$ | 0 $6\frac{1}{2}$ | 1 $2\frac{1}{2}$ | 1 8 | — | — | — |
| *Transvaal:* | | | | | | | | | | | | | | | | | | |
| Pretoria ... | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Johannesburg ... | 10 6 | — | 11 6¶ | 5 11 | 6 3 | 9 0 | 8 0 | 6 3 | 5 9 | 14 6 | 0 $1\frac{1}{2}$ | — | — | 1 3 | 1 9 | — | — | — |
| *Orange Free State:* | | | | | | | | | | | | | | | | | | |
| Bloemfontein ... | 12 0 | — | 14 6 | 6 0 | 7 0 | — | 7 0 | 6 6 | 7 0 | 11 0 | 0 6 | 0 6 | 0 3 | 1 6 | 1 6 | — | — | — |
| Harrismith ... | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

* Average, £10. 10s. to £11. † Average, 14s. to 17s. ‡ Average, 10s. to £3. § Average, 3d. to 5d. ‖ Average, 3d. to 7d. ¶ Sifted.

# Departmental Notices.

## TOBACCO SEED.

The Tobacco and Cotton Division has a quantity of selected and acclimatized tobacco seed of heavy and bright types for distribution during 1913. All applications for seed must be sent to the Chief of the Tobacco and Cotton Division, P.O. Box 516, Pretoria, accompanied by postal orders to cover cost of same.

This seed will be distributed pro ratio at a charge of 1s. per oz.

*Turkish Tobacco Seed:* The following varieties of Turkish seed can be obtained from the Officer in Charge of Turkish Tobacco Experiments, Stellenbosch, Cape Province, at the prices quoted, viz.:—

| | |
|---|---|
| Soulook | 4s. per oz. |
| Malcadje | 4s. „ |
| Baladovari | 4s. „ |
| Dubeck | 5s. „ |

W. H. SCHERFFIUS,
*Chief of Tobacco and Cotton Division.*

## CLEANING AND GRADING TOBACCO SEED.

The Tobacco and Cotton Division, Union Department of Agriculture, Pretoria, are prepared to clean and grade tobacco seed sent to them by farmers free of charge.

The process separates the light from the heavy seed, and the result is that a much arger percentage of the cleaned seed will germinate.

W. H. SCHERFFIUS,
*Chief of Tobacco and Cotton Division.*

## COTTON SEED.

Selected seed of several varieties of American Upland Cotton can be obtained from the Tobacco and Cotton Division, Union Department of Agriculture, Pretoria, at a charge of 3d. per lb.

In every case a remittance must accompany the order for seed.

W. H. SCHERFFIUS,
*Chief of Tobacco and Cotton Division.*

## VETERINARY RESEARCH LABORATORY, ONDERSTEPOORT.

### ADMISSION OF VISITORS.

It is hereby notified for the information of the public that visitors cannot be admitted to the Veterinary Research Laboratory at Onderstepoort during working hours on weekdays unless a special permit has previously been obtained from the Secretary for Agriculture.

The most convenient time for visitors to be shown over the Laboratory is Sunday afternoon, when an officer will be specially detailed for the purpose and permits will not be required.

## PIGS FOR SALE.

Large white Yorkshire and Berkshire Pigs are for sale from the Tweespruit Stud Farm, P.O. Tweespruit, and large Blacks and Berkshires from the Roodepoort Stud Farm, P.O. Dewetsdorp. Inquiries should be addressed to the Managers of the farms mentioned.

## ORGANIZATION OF DEPARTMENT OF AGRICULTURE.

| | |
|---|---|
| Administrative Office ... ... | Pretoria. |
| Telegraph Address ... ... | "Landbouw, Pretoria." |

Secretary for Agriculture: F. B. Smith. Under-Secretaries for Agriculture: P. J. du Toit and A. Holm. Deputy-Accounting Officer: J. Collie. Chief Clerk: G. N. Williams. Officer in Charge of Inquiry Office, Capetown: G. W. Klerck.

### VETERINARY DIVISION.

This Division endeavours to prevent the introduction of contagious diseases of live stock into the Union and to eradicate such as are already present, and to protect live stock against enzootic diseases by inoculation and other means. So far as it is able to do so without interfering with its other duties, the Division advises and assists farmers upon diseases of stock generally and endeavours to enlighten them upon veterinary hygiene and the care of live stock. For veterinary purposes the Union is divided into five areas, each in charge of Senior Veterinary Officers, who are responsible for the control of disease within these areas.

Principal Veterinary Officer : C. E. Gray. Assistant Principal Veterinary Officer : J. D. Borthwick.

*Cape Province.*—Senior Veterinary Surgeon : R. W. Dixon, Government Offices, Parliament Street, Capetown. Government Veterinary Surgeons : A. Goodall, Capetown ; W. Jowett, Capetown ; E. Fern, Capetown ; R. P. Jones, East London ; J. H. L. Lyons, East London ; W. P. Hamlyn, East London ; A. Mathew, Elliot ; W. A. Simson, Cradock ; W. Jones, Uitenhage ; J. Nichol, Kingwilliamstown ; W. G. Pakeman, Queenstown ; J. P. L. Goemans, Vryburg.

*Transvaal.*—Senior Veterinary Surgeon : J. M. Christy, Department of Agriculture, Pretoria. Government Veterinary Surgeons : R. S. Garraway, Pretoria ; W. G. Evans, Box 80, Volksrust ; P. Conacher, Box 877, Johannesburg ; J. I. Edgar, Pietersburg ; G. May, Box 151, Rustenburg ; H. M. Webb, Carolina ; G. C. Webster, Box 94, Barberton ; J. Chalmers, Box 31, Ermelo ; J. M. Tate, Standerton ; J. G. Bush, Box 83, Krugersdorp ; G. Lee, Box 93, Middelburg ; T. M. Dale, Box 230, Potchefstroom ; F. Dunning, Box 53, Lydenburg ; G. McCall, Box 15, Nylstroom ; D. B. J. McCall, Box 51, Zeerust.

*Natal.*—Senior Veterinary Surgeon : W. M. Power, Colonial Buildings, Pietermaritzburg. Government Veterinary Surgeons : S. H. Ewing, Eshowe ; A. F. Harber, Box 39, Point, Durban ; S. I. Johnston, Mooi River ; F. J. Hill, Ladysmith ; A. Goule, Maritzburg ; J. L. Webb, Bulwer ; C. Tyler, Port Shepstone ; and F. Hutchinson, Dundee.

*Orange Free State.*—Acting Senior Veterinary Surgeon : G. W. Freer, Government Buildings, Bloemfontein. Government Veterinary Surgeons : J. F. Joyce, Ficksburg ; J. R. R. Hamilton, Bloemfontein ; F. M. Skues, Bethlehem ; C. H. Wadlow, Smithfield ; and C. T. Clemow, Frankfort.

*Transkeian Territories.*—Senior Veterinary Surgeon : J. Spreull, Umtata. Government Veterinary Surgeons : A. M. Howie, c/o S.V.S., Umtata ; A. C. Kirkpatrick, T. M. Doyle, W. A. Dykins, J. J. G. Keppel, G. T. Henderson, and J. A. Worsley, Umtata.

### DIVISION OF VETERINARY RESEARCH.

The duty of this Division is the investigation of diseases of live stock with a view to discovering methods of eradicating them or of protecting animals against them. It examines and reports upon pathological specimens forwarded by the Veterinary Division and farmers and prepares vaccines and sera of various kinds, and also mallein, tuberculin, and other diagnostic and preventive agents.

Opportunities are offered to post-graduate students for the carrying out of special investigations and a great deal of educational work is performed by the Division.

The Division is in close touch with and is complementary to the Veterinary Division. Director of Veterinary Research : Dr. A. Theiler. Assistant Director of Veterinary Research : W. Robertson. Superintendent : E. Parkes. Professional Assistants : D. T. Mitchell, W. H. Andrews, D. Kehoe, F. Veglia, W. Jowett, G. N. Hall, G. A. H. Bedford, A. W. Shilston (Pietermaritzburg), and J. Walker (Grahamstown).

### DIVISION OF SHEEP.

This office is charged with :—(*a*) Eradication of scab ; (*b*) improvement of pastoral industries ; (*c*) the management of the Stud Sheep Farm at Ermelo ; (*d*) the improvement of the flocks maintained on the various Experimental Farms ; and (*e*) the control of the Field Cornets in the Transvaal Province.

Chief of Division : B. G. L. Enslin. Principal Sheep Inspector : A. G. Davison. Principal Sheep and Wool Expert : Charles Mallinson.

For the better carrying out of the work in connection with scab, the Union is divided into twenty-four areas in charge of Senior Sheep Inspectors ; these areas are in turn divided into 297 inspection districts, each in charge of an Inspector. In addition there are ten Inspectors employed on the railway lines for the prevention of the movement of infected stock by rail. There are also five whole-time Inspectors employed on certain large commonages.

A similar organization is adopted in respect of the improvement of sheep and wool.

*Orange Free State Province.*—Sheep and Wool Expert : J. F. McNab, Bloemfontein. Assistant Sheep and Wool Expert : A. V. M. Suter, Bloemfontein.

*Cape Province.*—Sheep and Wool Expert : W. M. McKee, Queenstown. Assistant Sheep and Wool Experts : E. V. Goddefroy, Worcester ; P. S. Taylor, Steynsburg.

*Transvaal Province.*—Western District Assistant Sheep and Wool Expert: A. M. Spies, Headquarters not yet fixed. Eastern District Assistant Sheep and Wool Expert: J. J. McCall, Cedara, Natal.

*Natal Province.*—Assistant Sheep and Wool Expert: J. J. McCall, Cedara, Natal. This area includes the East Griqualand District of the Cape Province.

Manager, Ermelo Stud Sheep Farm: A. G. Michaelian.

### DIVISION OF ENTOMOLOGY.

This Division obtains and disseminates information relative to beneficial and injurious "insects." In collaboration with the Division of Plant Pathology, it administers the law relating to the introduction of plants into the Union and by the inspection of nurseries and other methods, it endeavours to control injurious "insects" present in the Union; it is also responsible for the destruction of locusts.

Chief of Division: C. P. Lounsbury. Entomologists: Claude Fuller and C. P. v. d. Merwe, Pretoria; C. W. Malley, Capetown; ............................, Bloemfontein; and C. B. Hardenberg, New Hanover, Natal (investigating wattle insects).

### DIVISION OF BOTANY.

This Division is concerned with the investigation of the merits of indigenous plants of economic importance and of poisonous plants and noxious weeds, the identification of plants, the introduction and testing of economic plants from abroad and the improvement of farm crops by breeding.

Chief of Division: J. Burtt-Davy. Herbarium Assistant: Miss C. Stent.

### DIVISION OF PLANT PATHOLOGY AND MYCOLOGY.

This Division in engaged in the investigation and control of diseases of plants, produced by fungous and physiological causes, and the study and collection of fungi of economic importance.

Chief of Division: I. Pole Evans. Professional Assistants: Miss E. M. Doidge and P. v. d. Byl.

### DIVISION OF TOBACCO AND COTTON.

The object of this Division is the promotion of the tobacco and cotton industries Experiments are conducted in the breeding and growth of tobacco and cotton and in the curing, fermentation, and preparation of tobacco for the market. Approved varieties of tobacco and cotton seed are distributed amongst farmers and advice given to them personally and by correspondence and publications.

Chief of Division: W. M. Scherffius. Tobacco Warehouse Expert: T. E. Elgin. Expert for Turkish tobacco, Western Province, Cape: L. M. Stella, "La Motte," Paarl. Manager, Experiment Station, Rustenburg: H. W. Taylor. Manager, Experiment Station, Barberton: W. B. Wilson. Manager, Tzaneen Estate: E. H. F. Powell. Manager, Experiment Station, Piet Retief: R. Falgate. Manager, Cotton Experiment Station, East London: D. D. Brown.

### DIVISION OF DAIRYING.

This Division deals with all matters connected with the advancement of dairying. The Division also controls the Cold Stores at Vryburg.

Superintendent of Dairying: E. O. Challis. Senior Inspector:................................ Instructors: *Cape Province.*—T. R. Carruthers, Government Offices, Parliament Street, Capetown, and C. Schmolke, Queenstown. *Orange Free State.*—W. Oosterlaak, Government Buildings, Bloemfontein. *Natal.*—............................, Colonial Office, Pietermaritzburg. *Transvaal.*—L. J. Veenstra, Department of Agriculture, Pretoria.

### DIVISION OF HORTICULTURE.

This Division advises farmers on the growing and marketing of fruit, including table grapes and raisin drying, and grades fruit for export.

Chief of Division: R. A. Davis. Horticulturist in charge of Experiment Station, Warmbaths: C. A. Simmonds. Horticulturist in charge of Experiment Station, Ermelo: R. le Sueur. Instructor in Horticulture, Cape Province: S. W. van Niekerk, Bovenvallei, Wellington.

### DIVISION OF VITICULTURE.

This Division is charged with the duty of advising farmers in all matters relating to the culture of the vine (excluding table grapes and raisin-making) and the manufacture of wine and brandy, and vinegar. It conducts field investigations into the suitability of various stocks, the use of fertilizers, modes of cultivation, etc., and investigates the diseases of the vine, and conducts both cellar and laboratory experiments in the making of wine and brandy. It examines pathological specimens and furnishes reports thereon, and examines chemically and bacteriologically specimens of the products above mentioned with a view to furnishing advice thereon to farmers.

This Division also includes the Government Wine Farm, Groot Constantia, where advice can be obtained by residents in the Wynberg and Hout Bay areas.

Government Viticulturist: A. J. Perold, Œnological Station, Paarl, Cape Province. Manager, Government Wine Farm, Groot Constantia: T. L. Watermeyer.

### OFFICE OF GUANO ISLANDS.

This office undertakes the conservation, collection, shipment, and sale to the public of the guano, seal skins, etc., obtained on the various islands belonging to the Union, and is charged with the administration of all matters connected therewith.

Superintendent: W. R. R. Zeederberg, 69 Strand Street, Capetown.

### DIVISION OF CO-OPERATION.

This Division is engaged in promoting co-operation for the sale and purchase of agricultural products and necessities amongst farmers and in organizing and supervising co-operative societies.

Chief Inspector: C. H. Keet. Inspectors: J. Retief and H. Minnaar.

### DIVISION OF CHEMISTRY.

This Division investigates problems of general or special importance, and for the present undertakes the analysis of soils, manures, and foodstuffs for farmers in the Transvaal, the analysis of similar matters in the other Provinces being undertaken in the laboratories of the Department of the Interior at Capetown, Grahamstown, Maritzburg, and Bloemfontein, pending the enlargement of the chemical laboratories at the agricultural schools and experiment stations.

The analyses are conducted solely for the enlightenment of the farmers and not for legal purposes.

Chemist: H. J. Vipond. Laboratory Assistant: L. Bischoff.

### DIVISION OF FENCING AND BRANDS.

This Division administers the laws relating to fencing and brands, and publishes the Brands Directory, required by the Transvaal Act.

Controller of Fencing and Registrar of Brands: W. J. Nussey.

### OFFICE OF HOUSEHOLD SCIENCE.

The duties of this office are to promote the study of household science by means of lectures, demonstrations, and correspondence.

Lecturer and Instructor: Miss J. C. van Duyn.

### DIVISION OF DRY-LAND FARMING.

This Division conducts experiments and disseminates information on dry-land farming. An Experiment Station is maintained at Lichtenburg, with subsidiary ones at Pretoria, Warmbaths, and Pietersburg. Experiments in dry-farming are also conducted at the agricultural schools and experiment stations, and at other centres.

Dry-land Agronomist and Manager, Experiment Station, Lichtenburg: H. S. du Toit.

### DIVISION OF GRAIN INSPECTION.

This Division undertakes the grading of grain at the ports prior to export, and, if requested to do so, determines the amount of moisture present in grain intended for export.

Chief Inspector of Grain: G. F. Nussey. Government graders are stationed at the docks at Capetown, Port Elizabeth, East London, and Durban.

### DIVISION OF PUBLICATIONS.

This Division edits the *Agricultural Journal* and other departmental publications.

Editor: Dr. W. Macdonald.

### LIBRARY.

The object of the Library is to provide as complete a collection of agricultural literature as possible for the purpose of reference.

Librarian: P. Ribbink.

### AGRICULTURAL SCHOOLS AND EXPERIMENT STATIONS.

The duties of these institutions are to provide complete courses of education extending over a period of two years and shorter courses of a technical character for persons actually engaged in farming, to instruct farmers in the area served by them on matters relating to the various phases of farming by means of personal visits, lectures, demonstrations, and correspondence. To conduct experiments, to analyse soils, manures, dairy products, etc., and to identify plants and insects and test seeds. A certain amount of pure-bred stock and of new and approved varieties of seeds are produced on the farms and disposed of to the public.

The institutions do not undertake the administration of laws relating to agriculture.

*Elsenburg School of Agriculture and Experiment Station.*—Station: Mulder's Vlei; distance, $1\frac{1}{2}$ miles.

Sub-stations at Malmesbury and Robertson.

| | |
|---|---|
| Principal... | Dr. A. I. Perold. |
| Lecturer in Veterinary Science | R. Paine. |
| " Horticulture | L. Tribolet. |
| " Chemistry | D. C. Crawford. |
| " Engineering | W. H. Chandler. |
| " Botany and Plant Breeding | J. H. Neethling. |
| " Dairying | J. Gow. |
| " Agriculture | F. Fowlie. |
| Farm Manager | Vacant. |
| Agricultural Assistant | C. L. R. de Wet, George. |

*Grootfontein School of Agriculture and Experiment Station.*—Station: Middelburg Cape Province; distance, 2 miles.

| | |
|---|---|
| Principal... | R. W. Thornton. |
| Lecturer in Agriculture | G. J. Bosman. |
| " Veterinary Science | J. A. Robinson. |
| " Engineering | E. A. Morris. |
| " Chemistry | W. R. S. Ladell. |
| " Zoology and Entomology | R. O. Wahl. |
| " Dairying | J. Anderson. |
| " Sheep and Goats | E. N. C. Warren. |
| " Poultry | A. Little. |
| " Farm Manager | Van der Merwe. |

Agricultural Assistants: J. Meldal Johnson, Humansdorp; A. K. Hards, Cathcart; W. J. Lamont, Grootfontein; and Mr. Melle, Vryburg.

*Cedara School of Agriculture and Experiment Station.*—Station: Cedara, on farm sub-station at Winklespruit.

| | |
|---|---|
| Principal... | E. Harrison. |
| Lecturer in Chemistry | C. Williams. |
| " Biology | J. Fisher. |
| " Veterinary Science | F. J. Curless. |
| " Dairying and Poultry | A. Lawrence. |
| " Horticulture | C. R. Parsons. |
| Farm Manager | W. C. Mitchell. |

*Potchefstroom School of Agriculture and Experiment Station.*—Station: Potchefstroom; distance, $1\frac{1}{2}$ miles.

| | |
|---|---|
| Principal... | E. J. Macmillan. |
| Vice-Principal | H. Thompson. |
| Lecturer in Chemistry | T. G Reinecke. |
| " Botany | T. O. Bell. |
| " Zoology and Entomology | W. Moore. |
| " Veterinary Science | J. R. Quinlan. |
| " Engineering | W. S. H. Cleghorne. |
| " Poultry | R. Bourlay. |
| " Horticulture | W. Sturm. |
| " Dairying | J. B. Fisher. |
| " Agriculture | A. M. Bosman. |
| Farm Manager | Alex. Reid. |

### STUD FARMS.

At these farms pure-bred animals, mainly horses, are maintained and bred for lease and sale to farmers.

*Standerton Stud Farm.*—Station: Standerton; distance, 11 miles. General Manager: A. McNae.

*Tweespruit Stud Farm.*—Station: Tweespruit, on farm. Manager: J. J. Morton.

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## GOVERNMENT WINE FARM, GROOT CONSTANTIA.

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### VISITORS' DAYS.

It is notified by the Secretary for Agriculture that it has been decided that persons shall be allowed to visit the Government Wine Farm at Groot Constantia between the hours of 9 a.m. and 5 p.m. on Mondays, Tuesdays, and Thursdays.

## EXPERIMENT FARM, CEDARA.

### PURE-BRED POULTRY AND SITTINGS OF EGGS FOR SALE.

Cockerels of the following breeds are now available for sale from the Cedara Experiment Farm, Natal:—

Plymouth Rock, White Wyandotte, White Leghorn, and Buff Orpington, 7s. 6d. to 15s. each, f.o.r. buyer's nearest station (in Natal only) at buyer's risk.

Sittings of eggs from Plymouth Rock, White Wyandotte, English and American White Leghorns, Buff and White Orpingtons, and Indian Game fowls, will be for sale during September and October at 10s. per sitting f.o.r. buyer's nearest station (in Natal only). Guaranteed fertile on dispatch, and will be replaced only if returned, carriage paid, in box in which originally dispatched from Cedara. Egg-boxes charged 6d. each.

Applications to be made to the Principal, School of Agriculture, Cedara, Natal.

## ACCESSIONS TO DEPARTMENTAL LIBRARY.

### LIST OF COMPLETE WORKS ACQUIRED DURING APRIL, 1913.

List of complete works acquired during April, 1913:—

Broun, A. F.—"Sylviculture in the Tropics." London, 1912.
Castle, Wm., and others.—"Heredity and Eugenics." Chicago, 1913.
Elliot, S. B.—"The Important Timber Trees of the United States." Boston, 1912.
Haddon, Alf. C.—"History of Anthropology." London, 1910.
Hays. H.—"Farm Development." New York, 1912.
Kolle, Dr. W. E., and Dr. V. Wassermann.—"Handbuch der Pathogenen-Mikroorganismen." 2te Aufl., 2te Band, 1ste Hälfte. Jena, 1913. (Deposited with the Director of Veterinary Research, Onderstepoort.)
Krehl, L., and F. Marchand.—"Handbuch der Allgemeine Pathologie." 2te Band, 2te Abt. Leipzig, 1913. (Deposited with the Director of Veterinary Research.)
Le Roy des Barres, A.—"Etudes de Pathologie Chirurgicale Exotique." Paris, 1912. (Deposited with the Director of Veterinary Research.)
Lydekker, R.—"The Sheep and its Cousins." London, 1912.
Loeb, Jacques.—"The Mechanistic Conception of Life" Chicago, 1912.
Marshall, Chs. E., and others.—"Microbiology for Agricultural and Domestic Students." London, 1912.
Muschler, Dr. R.—"A Manual Flora of Egypt." 2 Vols. Berlin, 1912.
Oudemans, C. A. J. A.—"Catalogue Raisonné des Champignons des Pays-Bas." Amsterdam, 1904. (Deposited with Plant Pathologist.)
Potts, H. E.—"The Chemistry of the Rubber Industry." London, 1912.
Prothero, R. E.—"English Farming, Past and Present." London, 1912.
Smith, Thos.—"The Profitable Culture of Vegetables." London, 1913.
Von Fürth, Dr. O.—"Probleme der Physiologischen und Pathologischen Chemie." 2te Band. Leipzig, 1913. (Deposited with the Director of Veterinary Research.)

## EXPERIMENTAL FARM, POTCHEFSTROOM.

### SEEDS FOR DISPOSAL.

*Maize (Mealies).*—Price 20s. per 100 lb., delivered f.o.r. at buyer's station.

| *Colour and Character.* | *Variety.* | *Maturity.* |
|---|---|---|
| White (Dent) ... ... | Potchefstroom Pearl ... ... ... | Medium late. |
| " ... ... | Hickory King ... ... ... ... | " |
| " ... ... | Johnson County White ... ... ... | " |
| " ... ... | Iowa Silver Mine... ... ... ... | Medium. |
| Yellow (Flint) ... ... | Yellow Cango (white cob) ... ... | " |
| " ... ... | " (red cob) ... ... ... | " |
| Yellow (Dent) ... ... | Eureka ... ... ... ... ... | Medium early. |
| " ... ... | Reid's Yellow Dent ... ... ... | Early. |
| " ... ... | Chester County Mammoth ... ... | " |

This seed is shelled from carefully selected, butted, and tipped ears, true to type and character of each variety. The greatest care is exercised to secure uniformity in the seed supplied. Some varieties are however somewhat "unstable" in their characteristics, and in

exceptional cases cross-fertilization may have escaped detection. These deficiencies are reduced to a minimm as far as care in the selection of the seed will permit. Medium and late varieties are recommended for districts with a long growing period; the medium early and early varieties are the most suitable for districts with shorter growing periods.

Applicants who have no particular choice in regard to varieties are requested to state in their applications whether they prefer white or yellow varieties, when the seed will be sown, and when the first frost generally occurs on their farms. The undersigned will then select those varieties which are likely to prove the most suitable.

Application for these seeds should be made on or before the 15th August. No order will be "booked" until that date, but applications may then be closed and the available supply distributed pro rata among the different applicants. In that case only orders which are then definitely placed will be considered. An inquiry which is still the subject of correspondence will not be considered as a definite order. These seeds will not be forwarded on the c.o.d. system.

Orders must be accompanied by remittance, and cheques and money orders should be drawn in favour of the Principal, Experimental Farm, Potchefstroom, from whom any further particulars may be obtained.

*Seed Potatoes.*—It is hereby notified for general information that no seed potatoes will be available for disposal from the Experimental Farm, Potchefstroom, this season.

*Live Stock: Pigs.*—The sale of young pigs from this farm by private treaty has been discontinued for the present, as all the young boars and sows of the Large Black and Berkshire breeds are now being retained for the annual sale of stock which will probably be held here in October or November.

E. J. MACMILLAN, Principal.

# Export of Fruit.

THE following statement shows the description and declared value of fresh fruit exported from the Union of South Africa during the month of May, 1913, distinguishing port of shipment:—

| Description. | Via Capetown. | Via Port Elizabeth. | Via East London. | Via Durban. | Via Delagoa Bay. | TOTAL. |
|---|---|---|---|---|---|---|
| | £ | £ | £ | £ | £ | £ |
| Apples ... ... . | 64 | — | — | 4 | — | 68 |
| Apricots ... ... ... | - | — | — | — | — | — |
| Bananas ... .. ... | 21 | — | — | 34 | — | 55 |
| Grapes ... ... ... | 80 | 1 | — | — | — | 81 |
| Guavas ... ... ... | — | 2 | — | 2 | — | 4 |
| Lemons ... ... ... | 11 | — | — | 18 | — | 29 |
| Mangoes ... ... ... | — | — | . | — | — | — |
| Melons ... ... ... | 1 | — | — | — | — | 1 |
| Naartjes ... ... ... | 13 | 3 | — | 122 | — | 138 |
| Nectarines ... ... | — | — | — | — | — | — |
| Oranges ... ... ... | 61 | 15 | -- | 148 | — | 224 |
| Paw-paws... ... ... | — | — | — | 18 | — | 18 |
| Peaches ... ... ... | — | — | — | — | — | — |
| Pears ... ... ... | 52 | — | — | 8 | — | 60 |
| Pineapples ... ... | 3 | 34 | — | 71 | — | 108 |
| Plums ... ... ... | 2 | — | — | — | — | 2 |
| Other kinds ... ... | — | — | — | 54 | — | 54 |
| TOTAL ... £ | 308 | 55 | — | 479 | — | 842 |

Statistical and Audit Office,
23rd June, 1913.

# NOTICE.

The attention of intending settlers is invited to the provisions of Section 11 of the Land Settlement Act, No. 12 of 1912, which reads as follows:—

1. If any such person as in section 19 is described make written application to the Minister—

(a) requesting that certain land specifically mentioned and described by plan or otherwise in the application, be purchased by the Minister for settlement purposes on behalf of the applicant;

(b) stating the maximum purchase price of the land;

(c) stating that the applicant is willing to contribute forthwith not less than one-fifth of that maximum purchase price,

the Minister may, with the approval of the Governor-General and subject to the provisions of this Act, purchase the said land.

2. Before completing an agreement for the purchase of land under this section, the Minister shall require the applicant to deposit, or lodge satisfactory security for the payment of, the applicant's share of the purchase price and in determining the amount of that share regard shall be had to the actual purchase price, any modification of the terms and conditions of the application and of any special conditions to be included in the lease to be issued to the applicant as hereinafter provided. Any such modifications of the application shall be in writing signed by the applicant.

3. As soon as the purchase is complete and transfer of the land into the name of the Government has been obtained, the land shall be allotted upon lease to the applicant subject to all the provisions of this Act and at a valuation equal to the aggregate amount of the purchase price, cost of transfer, survey fees, and other expenditure of the Minister in connection with the purchase, transfer, and allotment of the land;

Provided that—

(a) the right of the lessee to purchase the land as hereinafter provided shall be deemed to have been exercised as from the date of the commencement of the lease;

(b) the amount contributed by the applicant towards the purchase price as aforesaid shall be considered as a payment by him on account of purchase price and any such half-yearly instalments of principal and interest payable as are hereinafter provided shall be reduced accordingly.

If the holding allotted as in this section provided be forfeited under this Act for any breach of or non-compliance with the provisions thereof or the conditions of the lease, the Minister may in his discretion declare that the whole or any portion of the amount contributed by the applicant towards the purchase price aforesaid be forfeited to the Crown.

Information as to the procedure to be followed in making application under the above-quoted section may be obtained from the Secretary for Lands, Pretoria, from whom also copy of the Land Settlement Act, 1912, may be obtained free.

G. R. HUGHES,
*Secretary for Lands.*

DEPARTMENT OF LANDS,
PRETORIA, *2nd June*, 1913.

30-35

# The Agricultural Journal

## OF THE UNION OF SOUTH AFRICA.

Vol. VI. AUGUST, 1913. No. 2.

Issued MONTHLY in English and Dutch by the Department of Agriculture.

Communications to be addressed to the Editor, Department of Agriculture, Box 515, Pretoria. Telegraphic Address: "Bulletin, Pretoria."

*Advertising* inquiries should be addressed to the Metropolitan Advertising Co., Box 962, Capetown.

## Editorial Notes.

Many farmers read very little, being under the impression that all that does not immediately bear on their farm or their district is no concern of theirs and is waste of time. But the advantage of good reading is not that one learns this, that, or the other fact, but that from reading good books one learns how to think. It is of comparatively little importance to farmers whether they have a wide knowledge of what is going on elsewhere, but it is of immense importance to farmers that their own general intelligence should be keen. Books are not merely to give information but to heighten intelligence.—*The Irish Homestead.*

### Agricultural Co-operation in Natal.

However varied may have been the fortunes of agricultural co-operation in other parts of South Africa, Natal has evidently whole-heartedly embraced the principle, and is apparently finding it all that oversea enthusiasts claim for it. Probably no one who has given the matter anything like serious thought will but admit the soundness of the principle of co-operation in itself, but where opinions do differ—and differ very widely—is in regard to the *modus operandi*, especially the question as to whether State aid should be sought. Without going into this latter question at the present moment, it will be instructive to glance at the results which have been achieved by agricultural co-operation in Natal. The present occasion is timely for the purpose, because of the coincidence of the second annual general meeting of the Natal Agricultural Co-operative Union, Limited (which was held in Maritzburg early last month), with recent criticism of the operations of certain of the Transvaal co-operative societies.

At the outset it may be stated that, although the Natal Agricultural Co-operative Union has just held its second annual general meeting only, the history of agricultural co-operation in that Province is considerably older than two years. The seeds of the co-operative idea—at any rate, the seeds that took root—were, we believe we are correct in saying, sown in Natal during 1906 and subsequent years by the then Secretary to the Minister of Agriculture, Mr. E. T. Mullens, who, by articles in the *Natal Agricultural Journal* and otherwise, did very useful pioneer work in the direction of bringing home to the farmers of that Colony the value of

agricultural co-operation. In addition he prepared a model set of rules for co-operative societies, and the extent to which copies of this publication were inquired after went to show that farmers there were ready for the new movement. The first results were the springing up of sundry societies in various parts of the Colony.

**The Agricultural Co-operative Union, Limited.**

It is only fair, however, to say here that, although it was at this time that the co-operative idea really began to take firm root in Natal, there had already been in existence for several years two societies—the Rosetta Co-operative Farmers' Union and the Natal Fruit-growers' Union—which were doing much useful work for their members. Yet the movement had hitherto shown no signs of spreading, and it needed a good deal of missionary work ere a more widespread adoption of co-operative principles was possible.

The odd societies that sprang up here and there do not appear to have achieved lasting success, with the exception of two—the Natal Wattle-growers' Union and the Natal Mealie-growers' Union. These evidently filled a want as, after running successfully for a few years, they were amalgamated, and the scope of the new society was made sufficiently comprehensive to attract farmers of all classes. This new organization is the Agricultural Co-operative Union to which we have referred. The union is established as a limited liability company, and is registered under the Natal laws. The old Wattle-growers' and Mealie-growers' Unions have retained their individuality, in the form of a Wattle Committee and a Mealie and General Committee respectively, and a third committee for live stock and wool has been added. To become a member of the union a farmer takes up one or more £5 shares, paying either in cash or by instalments over ten years. The union buys co-operatively for its members all that a farmer may require, and sells co-operatively all that they produce. The result is savings on purchases and better returns on sales. To show what this means to the member, the non-member has to pay 13s. or 14s. per bag for seed oats, the member of the co-operative union gets his seed oats for 12s. 6d. The price of arsenite of soda has been reduced from £3. 5s. to £1. 5s. per cwt. Superphosphate that is ordinarily sold for £4 per ton can be obtained by the members of the union at £3. 7s. 6d. By co-operative sales, too, better prices are obtained for produce, for the union can guarantee certain supplies, which naturally is appreciated by the buyer who is in a position to offer more favourable terms than he possibly can in the case of the individual seller. Terms in regard to purchases are cash on delivery, but by the combination of three or four other members up to twelve months' credit at 8 per cent. interest can be obtained, the members guaranteeing their combined accounts.

**The Value of the Secretary.**

Not the least interesting point in regard to the Agricultural Co-operative Union is the selection of representative farmers who have gathered together to take a leading part in its affairs as committee-men and otherwise. Such names as those of Sir Thomas Hyslop (the President), the Hon. F. T. Angus, W. L'Estrange, W. J. S. Newmarch, T. M. Mackenzie, W. N. Angus, C. H. Mitchell, Jos. Farquhar, C.M.G., John Marwick, E. W. Evans, T. Fleming,

Rev. James Scott, and W. L. Oldacre, who figure amongst the union's officials—all to be reckoned amongst the leading farmers of the Province—are sufficient to indicate the strength of the society as a farmers' organization. Nor should we omit to mention the part played by the energetic secretaries, Messrs. Duff, Eadie, and Mitchell, in making of the union a success. The success of an agricultural co-operative society depends in no small measure upon the capability of its secretary. Be the committee ever so competent, their work must be nullified or at least greatly reduced in effectiveness by an indifferent secretary. A strong energetic man, thoroughly versed at least in the economic side of farming, is necessary, and he should be a man who enjoys the confidence not only of the members, but also of the merchants and others of the outside public with whom he must necessarily come into business touch. We all know in how great a degree the success of an agricultural show depends upon the personality, the energy, and the resourcefulness of its secretary. Whilst this applies in a great degree to the large exhibitions, it is of even more certain application to the smaller shows. And just as this principle is true in its application to the agricultural show, it holds equally good in the case of the agricultural co-operative society. It would, indeed, appear to be a wise step, in the formation of small district co-operative societies, to select as secretary the secretary of the local show-holding agricultural association, where he has shown himself to be a competent manager. (This at least in the absence of a man whose abilities in the direction required are known to excel.) With such a man as secretary, and with a good committee of the most representative of the members, the society stands a good chance of succeeding.

**Purchase and Sale Societies.**

A good purpose would, we think, be served by the widespread publication of the presidential address of the Agricultural Co-operative Union, delivered at the meeting last month by Sir Thos. Hyslop, and we accordingly give publicity to the report in the present issue. We commend this to the careful perusal of farmers in all parts of the Union, as it not only shows what the Agricultural Co-operative Union is doing, but it is inspiring as illustrating the possibilities of agricultural co-operation in South Africa. South African writers on co-operation are naturally wont to draw their inspiration from European countries, showing what has been done there. Were they to look nearer home, they would find an illustration that would prove more telling because it is an actual local proof that co-operation will flourish in this country. It is certainly inspiring to look overseas for examples of co-operation—and to a certain extent the quotation of such instances is of value—but in doing so the objection may have to be faced that our conditions are so very different, that what has been done in Denmark, or Ireland, or Germany, is little criterion of what may be possible here.

Nevertheless, the European example shows one thing, namely, that, all the world over, the principles of co-operation are the same. Moreover, when we compare some of these European instances with the Natal example, we find that history is repeating itself in this country. The principles are the same, as we have said; it is only in matters of detail that the difference lies. The history of co-operation in the Transvaal and the Cape has not been as fortunate as one would have liked, but there have been some notable exceptions. Whether too much reliance has been

placed upon State aid, or whether there has not been a strict adherence to the principles necessary for the success of co-operation, we do not propose discussing now: the point which we wish to make is that, on the simple lines of buying and selling, co-operative principles have been proved possible of successful adoption in this country; and what we desire to urge upon farmers is the value of such societies. Large co-operative concerns have been started; some have succeeded, whilst others, from various causes, have failed. Farmers can, however, secure beneficial results with small buying and selling societies—indeed, the advantages of such organizations are greater than many people imagine. It is the buying of considerable quantities and the selling of considerable quantities that tell in yielding better prices, but there must be intelligent combination. The size of the society does not matter, except that the larger the membership probably the greater will be the advantages to each member. Half a dozen farmers, equally with half a thousand, may with advantage combine to form a co-operative society.

We cannot spare space this month for a further discussion of this question, but on a future occasion we propose to return to it and state some of the principles which are essential to the success of the agricultural co-operative society.

**A "Citrus" Interview.**

One afternoon a few weeks back we were favoured with a visit by Mr. W. A. Jonnes, the erstwhile commercial man, who, laying aside the pen for the plough, has now for some years been engaged in orange growing for export as well as for the local market, on his little holding at Brits, under the Magaliesberg. Mr. Jonnes brought to this new sphere of activity a mind unfettered by preconceived notions, together with the sharpened wits of a keen business man, and a determination thoroughly to understand the "whys and wherefores" of his new business, which is part of the stock-in-trade of every successful commercial man. Mr. Jonnes is an Australian, and is well endowed with the quick and observant mind that is one of the attributes of his fellow-countrymen. His reminiscences and his opinions of the present state and of the prospects of orange-growing in this country were accordingly interesting and instructive—and here it may be well to observe that, though Mr. Jonnes may be an Australian by birth, he is most certainly a South African by adoption and keenly enthusiastic on the question of the agricultural possibilities of this land.

"The possibilities of this country for citrus fruits, especially oranges," he observed, "are marvellous; people do not seem to realize it. In certain parts of Australia they have soils that are considered to be first-rate for oranges—and they are building up quite a big industry—but their soils won't stand comparison with ours. Think of our 'orange belt' in the Transvaal—that magnificent ironstone soil, composed of the washings of ages from the hillsides! You cannot touch the bottom of it in some places—I know, I have tried it on my land. It is wonderfully rich and just the right soil for citrus fruits."

**Our Wonderful Potentialities.**

"How did you start orange growing?" we asked.

"Well, I simply studied—everything I could lay my hands on—and continually bothered the Horticulturist, Mr. Davis, for information, to

whom I am deeply indebted for all his kind advice—indeed, I cannot speak too highly of what he has done for me, in the way of advice and so on. Mr. Davis also told me what varieties to go in for, and he advised me well. The result is that I could hand you an orange freshly plucked, almost every day in the year."

"That is a fine achievement," we observed.

"Yes; it is simply the result of careful selection of varieties. Of course, I go in mostly for Washington Navels—one of the finest oranges to grow, either for export purposes or for the local trade. I have, however, been going in for seedlings too, to a small extent."

"Why?" we asked: "surely the day of the seedling is passing?"

"It is," Mr. Jonnes replied, "in this country. There is still a demand for them, but the next five years will see a steady and permanent decline in the price. But in connection with this Mr. Davis the other day opened my eyes to a new aspect of the question, one that is well worth noting. He pointed out that the Washington Navels sell at a good figure in London, but that it is not every one who can afford them. Take the poorer working man, for example—say, the coster. When he buys oranges for his children, each child must have a whole one—there must not be any dividing up. The good cheap seedling is just the thing for them; it suits the coster's pocket.

"But apart from the seedling altogether," Mr. Jonnes proceeded, "think of the enormous market we have for our better oranges—Washington Navels for instance. Think of the ninety millions of people in the British Isles and on the Continent that want such an orange—and remember that they will get it at a time of the year when we shall be practically the only suppliers. For the Spanish oranges only come into the market when ours are out of it.

"And talking of Spanish oranges reminds me of an excellent article on citrus growing that appeared in one of our agricultural papers the other day. An excellent article it was, with one exception, and that was an unbusiness-like suggestion that we should bring the price of our oranges down to the price-level of the Spanish fruit. Why should we?"

"At any rate," we observed, 'if oversea consumers are willing to continue paying present prices they will do so; if not, prices will fall, in other words, the prices of our fruit will find their proper level."

"Yes, they will not need our help; artificial assistance is quite unneccessary, indeed undesirable and unbusiness-like."

"What do you think of the price of citrus land in the Transvaal?" we asked.

"Quite absurd, when you compare with California. There lands (planted) have sold up to £1000 per morgen and over; here they can be got for £8 to £10 and with fountain water, which, of course, is risky as fountains sometimes cease in time of drought and the orange must have water in the dry winter season. Citrus lands on the rivers with permanent water can still be got for £15 to £30, but it cannot last long at that as the demand is growing daily and lands under permanent water will ere long be worth ten times the present price when growers come along to get right into the export orange business. If California can do well at £1000 per morgen, what an outlook for us at £50 per morgen and European markets practically secured to us without competition for four months in the year at a figure which leaves 300 to 400 per cent. profit for the grower after all charges are paid! To my mind no agricultural proposition in the world can compare with orange growing in South Africa as well from the financial as from the health side."

**Oranges Along the Magaliesberg.**

"What are conditions like your way, as regards orange growing?" we asked.

"Bad! The possibilities of our part are splendid, but the methods of some of our orange-growers are impossible, and the same applies pretty well all along the Magaliesberg. A little while back I went with a friend to inspect a proposition that he thought of buying. We found the orchard in a dreadful condition. I have seen nothing like it—weeds waist-high. I asked the owner whether he was growing weeds or oranges. He said the weeds did not matter, they got oranges all the same. And this farmer, like many another, has the idea that weeds conserve moisture. I explained to him that, on the contrary, weeds steadily pump moisture out of the soil, but he could not see it. The fact remained that his trees bore oranges and that was what he wanted, the weeds did not matter.

"Take again my own place when I bought it. The previous owner had been practising irrigation—you know the style, a basin round each tree and furrows to lead the water from tree to tree. When one basin is full the supply is cut off and the water run on to the next and so on. I determined to change this. A neighbour came over, and seeing what I was doing, asked me what my idea was. 'Have you ever heard of "collar-rot"?' I asked him. No, he had not, and so I explained the effect of gallons of water slowly soaking in around the base of a tree. Unconvinced he proceeded to inform me that this method was necessary in order to supply the roots with moisture. I asked him how far out he thought the roots extended, and he was quite surprised (if he believed me) when I told him they ran out half-way across to the next tree on each side. I went straight ahead and started cultivating and mulching in order to conserve the rainfall. The result is that, the year I bought the farm, the seedling trees, of which I kept account, yielded 42,000 oranges, the next year 65,000, the following year 84,000 oranges, and this last year I picked 108,000 oranges. So that by my system—that is careful irrigation in winter, and careful tillage—I have obtained more oranges than my predecessor did with his careless irrigation, and I have healthier trees, too.

"I keep my land broken up with a disc harrow, using an ordinary peg harrow afterwards. As soon as the rains fall and the surface dries a little we have the harrows hard at it, and the result is that our land is moist underneath, even at this time of the year. In fact, with proper tillage we can get along well almost with the rainfall alone—that is to say, with the exception of about four months in the winter."

As a proof of the advantage of careful watering and intensive cultivation in orange growing, Mr. Jonnes further instanced his recent success at Rustenburg Show where he obtained "Special" prize for "the best oranges on the show" and "1st Prize" for Washington Navels. He has already sold this season's crop of Navels at 8s. to 10s. against the current market rate of 6s. to 6s. 9d., and has since received orders at the top rate which he is unable to supply. Seedlings are making 2s. 6d. to 3s. on the Johannesburg market and he is filling orders at 4s. 6d. to 5s.

Can any better proof be needed than this to show citrus growers who allow their ground between tree rows to become hardened and heavily grass grown that they are losing money? Mr. Jonnes' maxims are: plant the best trees you can get regardless of a slightly higher price, and treat them like babies; in other words, never allow them to want for attention,

and you will surely reap a fine reward. A grove of 500 trees well looked after costs less to maintain and yields more money than one of 1000 trees badly cared for.

**A Scandalous Proceeding.**

"Picking rather bothered us at first," Mr. Jonnes went on, "in the case of some of our old trees, which were quite twenty-five feet high. The problem was not only to reach the fruit at the top of the tree, but also to get the oranges inside the tree. The first difficulty my son and I overcame by means of a double tripod shaped ladder. The second one we got round by making a canvas tube, with string to go round the neck; we get into this and clamber up inside the tree, dropping the oranges down the tube to a basket. But before we had struck these expedients I thought I would profit by my neighbour's experience. I accordingly asked one of them how he managed to pick oranges from a twenty-five feet tree. 'That's easy enough,' he said, 'you just get a buck sail and spread it, then climb into the tree and shake the branches as hard as you can.' Did you ever hear of such a thing?"

"What about bruising the oranges?" we naturally asked.

"That is just what I asked him. 'Oh!' he said, 'a few get broken, it is true.' 'And what do you do with them?' I asked. 'Put them at the bottom of the sack, no one knows; and of course you put good oranges at the top—then they will sell quite all right.'"

"Had he the effrontery to tell you that?"

"He had—and, what is more, they do it, too, many of them.

"Talking about marketing, I used, of course, to pack all my fruit for the Johannesburg market, as well as elsewhere, in baskets, but my Johannesburg agents have written asking me to use small sacks."

"What on earth for?"

"Well, I suppose it is for convenience in handling on the part of the purchaser."

"But surely the fruit must get knocked about considerably in transit?"

"Undoubtedly it does. But that does not matter to me; they have asked for sacks, and they are getting sacks, and they must take the consequences."

**The Farmer as a Student.**

Mr. Jonnes threw an interesting sidelight upon the notorious disinclination of many farmers to study articles by experts upon subjects that closely affect them. He was passing through a certain farm one day when the owner, espying him, called him and asked his advice on some point in connection with his citrus orchard. "But why don't you write to the Government Horticulturist?" asked Mr. Jonnes. "He is an expert; I have only been a few years at the busines." "No, I want your advice," was the reply, "I have heard that you know a lot about orange-growing, and you can tell me what I want to know." "You mean to tell me that you prefer the advice of a man who has only been at the business for a few years to the advice of a man who has had a life-long experience?" Then noticing the *Transvaal Agricultural Journal* on a shelf, Mr. Jonnes asked his friend if he read that publication. He replied that he did not—it was of no use to him. Mr. Jonnes told his friend what he wanted to know and

satisfied him. Then he said: "Now, you turn up that issue of the *Agricultural Journal*, and I think you will find an article by the Government Horticulturist that gives just that very information you asked me for." The moral of this little story is too obvious to need pointing out.

So much for Mr. Jonnes' experience. We shall take an early opportunity, armed with a camera, of visiting Mr. Jonnes' farm and seeing for ourselves what he has actually accomplished, for the benefit of other growers of citrus fruits.

**A Point in Maize-growing.**

In the course of a personal letter to the writer, a young correspondent observes :—

I have disposed of my entire crop of groundnuts. . . . I got 9s. 6d. per bag f.o r. Durban for them, so did not do so badly. At the same time I do not think I shall go in for a large acreage next season : the cost of picking is very high : they cost me, as nearly as I can work out, 1s. 3d. per bag for picking only, whereas I can get my mealies reaped for under sixpence per bag. and, with the shelling, I reckon they cost me about sevenpence per bag. However, I do not intend giving up the groundnuts altogether; I will put in about the same acreage again next season. and give them a more extended trial. Of course, I have made as much out of the land as I should have done with mealies, so that the proposition cannot be called a failure ; but if I cannot make more out of the given acreage than I can make with mealies, I would sooner plant the mealies. the nuts being so much more trouble.

Here is a question with which many a farmer is confronted from time to time : two crops, one yielding a higher gross return per acre than the other, but with similar net results. Therefore—one is inclined to argue—why not go in solely for the lower-priced crop, which is easier to reap and handle, and which yields as good a return? In the present case, obviously our correspondent is wise in his determination to give earthnuts another trial (although he is evidently actuated by no more than the hope of securing, by careful handling, greater profit on the crop), since the earthnut belongs to the family of legumes and so is a gatherer of atmospheric nitrogen. A good crop of earthnuts will leave in the soil quite a considerable amount of nitrogen, which will be available for use by the subsequent cereal crop—maize, for example.

The point is one which should be well considered by maize-growers. Too often the nitrogen requirements of the maize plant are not sufficiently considered, if considered at all. Farmers know that phosphoric acid is required in order to produce a good crop of grain, and they accordingly—and wisely enough—run superphosphate or bone-dust through the drill at seeding time. Given a sufficiency of nitrogen in the soil, this procedure will ensure a profitable crop. Unfortunately, however, the position of nitrogen in the economy of the maize plant is either unknown, or ignored as a point of little importance : "there must be nitrogen in the soil, else the plants would not grow, and if they grow, the manuring with phosphoric acid will ensure a good yield of grain." So the argument is inclined to run. But how to be sure that a soil contains *sufficient* nitrogen : that is the point. It should be realized that, to make a strong, healthy plant, nitrogen is necessary—and a healthy plant is required to bring forth good ears of corn. In other words, a deficiency of nitrogen means that the full value of the phosphoric acid applied in the form of superphosphate, bone-dust, or otherwise is not secured.

Whether the farmer, in considering the question of nitrogenous manuring, decides to apply a commercial fertilizer or whether he will have recourse to atmospheric supplies obtained through the agency of

leguminous bacteria, will depend upon what in the circumstances of his particular farm he considers the more profitable, after full consideration has been given to all the factors of the question; but it is meet that we should point out the advantages of the latter mode of nitrogenous manuring.

**What is Soil Fertility?**

The fertility of a soil may be defined as its capacity for production. This is a wide definition and needs elucidation. If a soil is to produce it must possess certain mechanical properties, and it must contain the food requirements of plants—of which the three principal are, of course, phosphoric acid, potash, and nitrogen. We are not going to venture upon a comprehensive disquisition on all the qualities that make for fertility in a soil; our object is simply to give readers—and maize-growers in particular—an idea of the more important aspects of the subject. The principal mechanical properties, then, to which we have referred are the ability of a soil to hold moisture, its capacity for drainage—i.e. in order that it may not become water-logged—and its texture, which must be such that air can be freely admitted. On the one hand, soil that is of too clayey a nature—which is inimical to drainage and to the admittance of air—must be rendered more friable by dressings of lime; while on the other hand soil that is too sandy, and thus unable to hold a sufficiency of moisture, may be improved in "body" either by dressings of farmyard manure or by the ploughing under of a green crop. A clay soil, too, is greatly improved in mechanical condition by the addition of farmyard or green manure.

This brings us to the consideration of the soil's content of plant food. For whilst we are improving the mechanical condition of a soil by the addition of an organic manure, we are at the same time more or less enriching it in plant food. This applies more so in the case of farmyard manure, which contains most of the constituents required by plants. Conditions in this country, however, are such that only in a few cases is the application of farmyard manure a feasible proposition. There are, it is true, a few maize-growers who are busy thus manuring their lands, treating the fields in succession year after year and beginning again after the circle has been completed. For the majority, however, the practice of green manuring will commend itself as the most practicable. In the case of maize-growing, of course, this means that one field each year remains idle, but there are few farms in this country where all the arable land is under crop.

**A Discussion of Green Manuring.**

Green manuring is of two kinds. A non-leguminous crop may be grown and ploughed under when it has attained its most luxuriant growth, in which case naturally no addition is made to the store of plant food in the soil, the constituents taken out by the crop being returned. This method of green manuring is practised solely for the purpose of improving the "body" of the soil, in other words, of adding to its humus content. A fertile soil requires to be rich in humus, since this enhances its moisture-holding capacity, yet without incurring the risk of water-logging. The other method of green manuring is that of planting a leguminous crop—

peas, beans, earthnuts, cowpeas, and so on—and ploughing it under in the same way as under the former system. The advantage of this practice is that, not only is humus added to the soil, but the nitrogen-content of the land is considerably increased.

We return now to our original consideration—the position presented by our correspondent. In this case, of course, there is no question of green manuring, as the earthnuts are required for market, and by the time they mature the plant itself is of little value from a humus point of view. Ploughed in, nevertheless, after the harvesting of the nuts, the dried plants would increase the store of nitrogen in the soil. Our correspondent, however, keeps pigs, but does not go in for dairying, and he is accordingly using the earthnut plants as forage to meet the nitrogenous requirements of his pigs during the winter, and he will probably, therefore, find this a more economical method of utilizing the dry plants. Where he scores, however, is in the supply of nitrogen which the plants have left in the soil —nitrogen gathered from the atmosphere during the growth of the earthnuts, and stored up in the roots.

It is because of this addition of nitrogen to the soil that we recommend our correspondent, and other maize-growers in suitable districts, to go in for earthnuts. Even a small acreage will be of material assistance, the idea of course being to grow the crop on a fresh field each year, following it with maize during the seasons required for the covering of the other fields in succession.

This is a modified rotation which would materially help maize-growers to secure better crops and stay the wearing out of the land. By ploughing in a green crop now and then the results would be even better; but how frequently this can be done, of course, must depend upon local circumstances.

**State Aided Immigration.**

Farmers and others will be interested to learn that provision has been made for the granting of State assistance in connection with the introduction into the Union of European agriculturists and farm employees, regulations in connection with which were gazetted on the 8th July. On application by persons who are connected with the farming industry and are *bona fide* residents of the Union, the Minister of the Interior will be prepared, in his discretion, to arrange passages to the Union for European agriculturists and farm employees, together with their wives and children. Persons desirous of introducing immigrants of the class in question will be required to enter into an agreement on the prescribed form, which may be completed by the immigrant before the High Commissioner for the Union or any other officer designated by the Minister. Such agreement must provide that the immigrant shall be paid an adequate wage (at a rate approved by the Minister) for a period of at least three years from the date of his arrival in the Union, that suitable employment will be provided for him on the land, and that satisfactory housing accommodation will be found for him and his family. Should a contract entered into between an employer and an immigrant be terminated from any cause within the control of the employer before a period of three years has elapsed, the employer may, in the discretion of the Minister, be held liable for any expenditure incurred by the Government in connection with the introduction of the immigrant and his family into South Africa, and in connection with their repatriation should such a course be found necessary,

and in connection with any service performed in their interests. The employer will further be held responsible for any expenditure caused to the Government as the result of wrong or misleading information supplied when the application for assisted passages was made.

**How the Government will assist.**

The assistance which will be accorded to the immigrant under these terms will consist of free transport by sea and land to his destination for himself, his wife and children, and for a reasonable amount of baggage and personal effects. The Government will defray one-half of the expenditure incurred at third class rates in introducing an immigrant and his family, and the balance will be charged to the employer, who will in all cases be required to deposit the necessary amount in advance before any commitments will be made by the Department in respect of his nominee or nominees. The Government accepts no responsibility for any greater expenditure than is indicated in the preceding sentence; neither will any responsibility be accepted in respect of any immigrant or member of his family, or of his baggage and effects, during his journey to the Union or after his arrival; whilst if for any reason expenditure is incurred by the Government through failure or neglect on the part of any employer to make suitable arrangements for the reception of any immigrant introduced at his request, such employer will be liable for the same. No passage will be arranged until certificates as to the medical and physical fitness and as to the good character of an immigrant and the members of his family accompanying him are submitted to the proper officer; and nothing in these regulations is to be deemed to exempt any assisted immigrant from the provisions of the Immigration Law for the time being in force.

Immigrants introduced in this way, who are desirous of engaging in farming operations on their own account on the termination of their contracts of employment, will be assisted as far as possible to settle on the land.

The Secretary for the Interior, Pretoria, will furnish all information and the necessary forms on application to any one who may be desirous to avail himself of the assistance which the Government is now offering.

**How Government Farms are Acquired.**

From time to time we receive inquiries as to the prospects of settlement in this country and the facilities there may be for obtaining land on easy terms from the Government, and it will accordingly perhaps be useful here to give a brief outline of the present situation. The passing of the Land Settlement Act during the 1912 session of the Union Parliament brought about uniformity of practice in the various Provinces as regards the acquirement and disposal of land suitable for settlement purposes. Briefly, the mode of procedure is as follows:—Crown lands and alienated lands that have since been reacquired by the Government, suitable for farming purposes, are cut up into holdings of useful size (which varies, of course, with the district, proximity to a railway line, climatic and soil conditions, etc.) and advertised for allotment to European settlers. All applications received are considered and dealt with on their merits by land boards in each Province specially appointed for the purpose, and these boards submit recommendations to the Minister of Lands as to which applicant should be allotted the farm applied for. In the event of there

being two or more candidates for the same holding, with equal qualifications, recourse is had to the ballot. Allotments are made by the Minister of Lands only to applicants possessing the prescribed qualifications, e.g. they must be eighteen years of age at least; possess qualifications sufficient for utilizing the land the subject of the application; intend in good faith to occupy personally and develop and work beneficially the said holding; be of good character; possess capital sufficient to develop and work the holding beneficially, or, in any special cases, possess such amount of capital as, after report by the board, the Minister may deem fair and reasonable; declare that they will develop and work the holding exclusively for their own benefit and the members of their families, if any. As far as possible preference is given to applicants who are not already owners of land.

Farms are allotted on lease for a period of five years, the rental being calculated as follows:—For the first year, nil; for the second and third years at the rate of 2 per cent. per annum on the purchase price; and for the fourth and fifth years at the rate of 3½ per cent. per annum on the purchase price. The allottee has the option of acquiring the land at any time during the currency of the lease, or at the expiry thereof, on terms of conditional purchase lease extending over a period of twenty years.

The settler has thus up to the beginning of the second year before he is required to pay interest on the capital value of his holding, when his half-yearly rental at the rate of 2 per cent. falls due. To show what this may amount to, let us take a concrete case. A farm of 2073 acres, in Natal, has lately been offered for allotment by the Government at a purchase price of £1059. 11s. 9d. The half-yearly interest on this for the second and third years is £10. 11s. 11d. In the fourth and fifth years the rental is raised to 3½ per cent.—in the case under notice this amounts to £18. 10s. 10d. These terms refer to leasehold only. Should the settler wish to exercise his option of conditional purchase, his half-yearly payments now will include capital, and interest at 4 per cent., spread over twenty years. In the case of the above farm this amounts to £38. 14s. 8d. every six months.

Lists of farms available, with full particulars as to rental, purchase price, and instalments in the event of purchase, are published from time to time in the *Government Gazette*, and a list is contained in the present issue of the *Journal*; whilst full information can be obtained at all times from the Secretary for Lands, Pretoria, to whom all applications for Crown land in the Union should be addressed.

The Land Settlement Act, 1912, also empowers the Minister of Lands to acquire private land on behalf of persons possessing the qualifications referred to above, who are prepared to contribute forthwith not less than one-fifth of the actual purchase price and to comply with all the provisions of the Act. The Government pays the balance of the cost of the land and allots the holding to the applicant on conditional purchase lease for twenty years, during which period the balance of the capital plus any incidental expenditure incurred by the Minister in connection with the purchase, transfer, and allotment of the land, with interest at 4 per cent. per annum, is repaid to the Government in half-yearly instalments. In these cases there is no preliminary lease period of five years as is given in the case of ordinary Crown lands, and, therefore, the first half-yearly instalment of capital and interest (the instalments are payable in advance) becomes due and payable on the date the lease commences, which is the date transfer of the land is made to the Government.

Any person deciding to apply to the Government specially to purchase a holding for him should make written application to the Minister of Lands giving full information regarding the name, situation, extent, and price of the land, and should state that in the event of the application being granted he is prepared to contribute forthwith not less than one-fifth of the purchase price of the land and to comply with the provisions of the Act. At the same time he should forward an option of purchase over the land, granted by the registered owner thereof, for a period of, at least, six weeks, but preferably for a longer period. The option, which should be in favour of the Minister, should correctly describe the land, state the lowest price at which it can be bought, and carry full rights. Applicants should also furnish detailed particulars of their capital (cash, stock, farming implements, etc.) on the prescribed form, which may be obtained from the magistrates of the various districts or direct from the Department of Lands, Pretoria.

All applications should be sent to the Secretary for Lands, Pretoria, to be submitted for the consideration of the Land Board appointed for the area in which the land is situate. No assurance is, of course, given that any proposal submitted will be entertained by the Minister, nor does the Government refund any expenditure incurred by the applicant in connection with the application. Each proposal is dealt with entirely on its merits and decided accordingly. It might, however, be mentioned that in cases where an agreement of purchase has already been entered into by the applicant such will not be considered, nor will applications from farmers for the Minister to take over their farms from bondholders and sell such farms back again to them in terms of the Act be entertained. The purpose of the Act is to settle persons on the land who do not already own land, but who possess a certain amount of capital and are able to purchase a farm with the assistance of the Government and personally occupy it in accordance with the provisions of the Act.

**Will there be A Petrol Famine?**

We publish this month an article on the possibility of a petrol famine taken over from the Cradock paper, the *Midland News*. Mr. Victor Hart, the writer of this article, discusses the question entirely from the point of view of motor-car owners and users of internal combustion engines, but there is an aspect of the matter which closely concerns farmers. The point of Mr. Hart's reflections is that the time seems to be approaching when owners of internal combustion engines will find themselves faced with something like a famine in petrol. Petrol is distilled from the same crude oil that produces paraffin; and the situation may, from the information given by Mr. Hart, be concisely presented thus:—

(1) Although new fields of crude oil are from time to time being opened up, the old fields are as rapidly being exhausted.

(2) The enormous increase in the number of motor-cars and motor-cycles in every country is naturally giving rise to an ever-increasing demand for petrol. The sudden development in the use of internal combustion engines for marine purposes, too, is adding greatly to the demands.

(3) Practically the whole of the crude oil fields of the world are controlled by two gigantic financial trusts—one in America and the other in Europe.

(4) The demand is keeping pace with, and even slightly exceeding, the supplies, and the result is that in England the price of petrol has risen in the space of four years by over eighty per cent.

That then briefly seems to be the position. The question naturally arises: What is going to take the place of petrol in the future? For obviously, unless further fields of crude oil be discovered, a substitute will have to be found. What is wanted, too, is a cheap substitute. Though fresh oil-fields may be discovered, we have trusts dominating the situation, and the time would appear to be ripe when some practical steps to make use of such substitutes as are available might be taken.

This aspect of the matter, of course, is one that rather concerns users of internal combustion engines, who, when the pinch is beginning to be sorely felt, will be driven to investigate the claims of such substitutes as are offered; but the farmer is concerned in this way, that he may in the future be the producer on a large scale of the raw materials from which substitutes may be made.

**Alcohol *versus* Petrol.**

Some years ago this matter was investigated in Natal by the Government Chemist, Mr. Walter Pay, who conducted practical tests with alcohol produced on the sugar estates. Denatured alcohol—or methylated spirit, as it is popularly known, although the alcohol is not always denatured with methyl—has long been a by-product on the Natal sugar estates, and much of the "methylated spirit" sold in this country is, we believe, of local production. Here was evidently a never-ending source of production of a substitute for petrol, and Mr. Pay, noting this, undertook a series of exhaustive experiments. He proved that our alcohol could be used for the purpose, especially if, in denaturing, a substance were utilized that would improve its efficiency, and if a different form of carburettor were installed in the engines. Neither condition is likely to present any difficulties. All that was required at the time was to make it worth the motorist's while to change his carburettor by supplying denatured alcohol in unlimited quantities and at a cheaper rate than he had to pay for petrol. But as it was, the change from petrol to alcohol was not made worth his while, owing to the existence of a trust that kept up the price of alcohol. The change has not come yet, but that it must come appears to be apparent from the evidences of an approaching petrol famine which Mr. Hart presents. It is a matter for the future, of course, but we refer to it here in order to draw the attention of farmers to the possibility of the situation.

The sugar-planter, however, is not the only farmer concerned. The maize grower has an interest in the matter; it is probable that the disposed prickly pear may likewise be made, by distillation, to yield a spirit of commercial value; and there are other plants which it will be possible to utilize in this way. Wood also yields alcohol, and if we suggest that herein lies a profitable source of utilization of the waste timber with which our wattle plantations abound, we shall not have been the first to raise the question, since it formed the subject of an interesting discussion in the pages of the *Natal Agricultural Journal* a few years ago.

We do not propose dealing further with the matter at the present moment, our desire simply being to call readers' attention to the possibilities of the production of industrial alcohol in this country, when the time comes that a substitute for petrol is sought by users of internal

combustion engines—and, judging by the increasing price of petrol, that day does not seem distant.*

**Girls' Poultry Clubs.**

The position of women in farming is a question that is rarely discussed in this country. Ordinarily they are looked upon as a negligible quantity, although we know personally of several cases in South Africa where women farmers have made a great success of their business. In the United States the place of the women on the farm is fully recognized, more particularly in connection with the handling of poultry, bees, and other side-lines to which the men themselves may not be in a position to devote sufficient time. The Bureau of Animal Industry of the United States Department of Agriculture has recently issued a useful pamphlet on the organization of girls' poultry clubs, and as the idea should be possible of adoption in this country we may give the leading principles that will be of assistance in organizing such work. The rural organization of the United States is, of course, different from that of South Africa, but here it should be possible (following the lines suggested for America) to organize girls' poultry clubs in connection with the agricultural associations and hold an exhibition every year in conjunction with the agricultural show, at which a pair of the best chickens raised by each member might be placed on exhibition and entered to compete in the regular classes for the usual prizes offered by the agricultural society as well as for special prizes offered for members of the girls' poultry clubs. An exhibit of the best dozen eggs might also be made. "It will be well to have a president," says the pamphlet to which we have referred, "one or more vice-presidents, and a secretary. A simple constitution and by-laws should be adopted. It will be found profitable to divide the country organization (i.e. the agricultural society) into townships, schools, or school districts, and have local meetings at school houses or at different girls' homes occasionally." Again we find the suggestion: "It will be found best to distribute the prizes as widely as possible. Honour and recognition sometimes count for more than money. Badges, certificates, and diplomas given to the club members are often more appreciated than money and expensive premiums. When liberal amounts are offered, it will be well to give them in every township or school district, and offer premiums to the school that will make the highest records with five or ten in a team, dividing this premium into several different awards, depending upon the rank."

The pamphlet urges that members of girls' poultry clubs shall strictly adhere to the following rules in handling their poultry and eggs:—

(1) Keep the nests clean; provide one nest for every four hens.

(2) Gather the eggs twice daily.

(3) Keep the eggs in a cool dry room or cellar.

(4) Market the eggs at least twice a week.

(5) Sell, kill, or confine all male birds as soon as the hatching season is over.

The idea is one that should commend itself to the lady members of our

* After these notes were in type, the following *Reuter* cable from London was published in the daily Press:—"The Imperial Motor Transport Conference to-day decided to appoint a committee to carry out a thorough investigation into the merits of alcohol and other substances as substitutes for petrol as motor fuel."—ACTG. ED., *A.J.*

agricultural societies as one that will afford a useful outlet for the energies of farm girls, besides constituting a further stride in the progress of the poultry industry of this country.

**The Month and the Magazines.**

According to the *Crop Reporter*, published by the United States Department of Agriculture, wheat is very far from being king in that country. In value maize is greatly ahead of any other crop, representing 26·2 per cent. of the value of all crops together when the census of 1910 was taken. Hay and forage came next with 15 per cent., followed by cotton and cotton-seed representing 12·4 per cent., and wheat valued at 12 per cent., oats at 7·6 per cent. These five crops represent 75·8 per cent. of the value of all crops, leaving 24·2 per cent. as that of all fruit, vegetables, barley, and other crops not named above.

*Hoard's Dairyman* discusses the question of the selection of sires for grade herds. The writer impresses upon owners of dairy herds the need for raising the standard of quality in the bulls they use, pointing out that there are thousands of farmers who will buy and use the poorest bull they can get just because they can buy him cheap. Attention is drawn to the parallel case of the farmer who might deliberately purchase poor, infertile seed maize because he could buy it a dollar a bushel less than he would have to pay for good seed; and the man who uses a poor, ill-bred sire because he can buy him cheaply is in the same position.

The *Journal of the Board of Agriculture* (London) says that poultry keeping in Ireland is primarily a woman's industry. Its regeneration has been effected in no small degree through the agency of women; during the past twelve years the educational work has been carried out almost exclusively by women teachers. The success of this systematic attempt to improve the conditions of poultry-keeping in Ireland is reflected to some extent in the export returns. During the period from 1904 to 1910 the average *yearly* increase in the value of the eggs, poultry, and feathers exported from Ireland amounted to £720,000.

The latest volume of the *Transactions* of the Highland and Agricultural Society of Scotland contains an eloquent plea by Mr. John Drysdale, of the Scottish Agricultural Organization Society, for the preservation of milk records. He points out that by their adoption the business of dairying is made more interesting, they provide an admirable check on the efficiency of the milkers, and, what is of very great importance, give an index to the health of the cow from day to day. By this means, we are told, cases of illness can be detected in their early stages and prompt measures taken to deal with them. Further, it acts as a check on irregularity or carelessness in the feeding of cows.

According to the *Queensland Agricultural Journal*, a German in Peru has invented an electrical tapper for rubber trees. Hollow iron channels, divided into sections, are fitted on the tree trunk, the sections containing pricking devices that can be worked at varying times by current from the central station. A receptacle in each section catches the latex, coagulating it with acid. The attachment may be left unvisited two or three months and in the time 200 or 300 lumps of rubber may be accumulated from a large tree.

The *Agricultural Gazette* (London) observes that, judging from the voluminous reports on credit banks published month after month by the International Institute of Agriculture, it would seem that farming is

carried on in most European countries mainly by means of borrowed money; also in India and Japan to a less extent; Great Britain, the British Colonies, and the United States appear to have managed to conduct farming enterprise without any considerable resort to co-operative credit. The system has spread slightly in England, but the business done by it is the veriest trifle. In Ireland it has made greater headway.

The same journal also has a note on the Whixall Cow Insurance Society. Whixall is a rural parish in north Shropshire. The society, which was formed in 1842, is now the largest registered cow insurance club in England and Wales, and at the end of last year consisted of 298 members and insured 1395 cows and calves. A member pays one shilling per cow as entrance fee, and one shilling per quarter as premium for each cow; for a calf he pays sixpence entrance fee and ninepence per quarter as premium. The society pays the value of each animal that dies from disease or accident while under insurance, subject to a maximum of £10 for a cow and £5 for a calf. No member is allowed to insure more than eight cows and six calves.

The *Graaff-Reinet Advertiser* tells of a chat with Mr. A. Little, the Lecturer in Poultry at the Grootfontein School of Agriculture, in the course of which the poultry expert spoke of a certain farmer's wife "not a thousand miles from Graaff-Reinet," who had gone in for poultry so thoroughly that her husband often complained that she gave too much time and trouble to it. However, the scene was changed when it was found that the good wife was able to pay half the children's schooling expenses at the boarding school, and also provide a cheque for £20 towards the expenses of the annual trip to the seaside, all out of her poultry profits. Then the drought came, and the farmer had to feed his ostriches with maize to keep them alive. And it was the poultry cheque-book that paid for the maize for the ostriches.

# The Chemical Composition of South African Maize and other Cereals.

By Dr. C. F. JURITZ, Chief Chemist, Cape Province.

NEARLY two hundred samples of South African-grown cereals have been analysed in the Cape laboratories at various times during the past eight years for the purpose of determining their feeding values. The results of many of these analyses have already been published, at all events in so far as they pertain to oats, wheat, and barley.* It remains, however, to fulfil a promise made in my Annual Report for

* For "Oats." see Cape Senior Analyst's Annual Report for 1905, pp. 34 and 35, also J. Lewis, "Analysis of Colonial Oats," *Cape Agricultural Journal*, Vol. 33, pp. 358–366: for "Wheat," Senior Analyst's Annual Report for 1909, pp. 147, 148: for "Barley," C. F. Juritz, "Composition of Cape Barley," *Union Agricultural Journal*, Vol. 3, pp. 516–529.

1910, where the hope was expressed that an opportunity might be afforded of investigating maize in the same way as the other cereals above mentioned. The hoped-for occasion soon arrived, and although circumstances prevented the fullest advantage being taken thereof the results arrived at were nevertheless such as to warrant their being placed on record at the present stage of the investigation.

Before dealing with maize it will be useful to gather up the threads of our inquiries in respect of the other cereals, and to add to them a few details of later date than those previously recorded.

## OATS.

The origin of the whole series of investigations was the appearance of a disease amongst the horses in the military camp at Middelburg during the early part of 1905. This disease, which was said to resemble *osteoporosis*, was in the first instance ascribed to the lack of certain mineral constituents in Colonial oats. It was understood that the alleged unsuitability of Cape oats for feeding horses arose from a supposed deficiency in lime, and so, in the first instance, five samples of oats were submitted for analysis. One of these only was of Cape origin; the other four were imported Algerian, South American, Canadian, and Australian oats. The analyses resulted as follows:—

| | Percentage: In Original Oats. | | | Percentage: In Ash. | | |
|---|---|---|---|---|---|---|
| | Ash. | Lime. | Phosphoric Oxide. | Lime. | Phosphoric Oxide. | Carbon and Silica. |
| Cape... ... ... | 2·67 | ·077 | ·441 | 2·90 | 16·53 | 55·60 |
| Four imported samples (average) | 3·18 | ·095 | ·607 | 3·01 | 19·81 | 52·45 |

As far as these few analyses went there seemed no foundation for attributing disease to a particular lack of lime in the Cape oats, but bones consist mainly of phosphate of lime, and therefore a comparison of the amounts of phosphoric oxide seemed essential. Taking the samples all round the phosphoric oxide was appreciably higher in the imported* than in the Cape oats, but as it was quite impossible to consider these few analyses as definitely settling the question of the composition of Cape oats it was decided to procure a fairly large number of samples for analysis from different parts of the country. At the same time it seemed that, even supposing the foregoing analyses were truly representative, and that so small a difference in phosphates could be held accountable for a chronic ailment or a gradual deterioration of stock, it could certainly not account for any acute outbreak of disease such as was laid to its charge at Middelburg, and least of all in regard to adult stock.

Then followed the series of analyses published in Vol. 33 of the *Cape Agricultural Journal*. Fifty-two samples of oats were procured from the Districts of Piquetberg, Malmesbury, Cape,

* Except the Algerian sample, which contained ·477 per cent. of phosphoric oxide in the original oats and 12·93 per cent. in the ash.

Stellenbosch, Caledon, Bredasdorp, Robertson, Alexandria, Kingwilliamstown, Cathcart, and Queenstown, and from these the following average results were obtained:—

| Number of Samples. | Division. | Water. | Proteins, N × 6·25. | Fat. | Digestible Carbo-hydrates. | Fibre. | Ash. | Phosphoric Oxide. | Lime. | Fuel Value: Calories per pound. | Nutrient ratio. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | Piquetberg ... | 10·37 | 9·83 | 6·12 | 59·54 | 10·80 | 3·34 | ·57 | ·093 | 1510 | 7·5 |
| 6 | Malmesbury ... | 9·50 | 9·47 | 6·16 | 61·53 | 9·92 | 3·24 | ·48 | ·091 | 1544 | 8·0 |
| 2 | Cape ... ... | 10·13 | 7·92 | 6·16 | 62·14 | 10·00 | 3·64 | ·46 | ·108 | 1524 | 9·6 |
| 1 | Stellenbosch ... | 10·35 | 7·98 | 5·85 | 62·43 | 10·05 | 3·34 | ·50 | ·118 | 1518 | 9·5 |
| 6 | Caledon ... | 9·78 | 8·37 | 6·58 | 60·74 | 10·81 | 3·72 | ·46 | ·095 | 1524 | 9·0 |
| 6 | Bredasdorp ... | 10·48 | 8·41 | 6·63 | 61·57 | 9·43 | 3·49 | ·47 | ·102 | 1541 | 9·1 |
| 5 | Robertson ... | 9·66 | 8·76 | 6·08 | 60·61 | 10·94 | 3·96 | ·67 | ·112 | 1508 | 8·5 |
| 3 | Alexandria ... | 10·05 | 9·70 | 5·79 | 60·35 | 10·59 | 3·53 | ·57 | ·107 | 1509 | 7·6 |
| 2 | Kingwilliamstown | 8·98 | 9·30 | 6·31 | 62·28 | 9·71 | 3·42 | ·48 | ·086 | 1557 | 8·2 |
| 10 | Cathcart ... | 9·59 | 10·41 | 5·56 | 60·64 | 10·09 | 3·70 | ·62 | ·104 | 1518 | 7·0 |
| 5 | Queenstown ... | 9·69 | 10·98 | 5·33 | 60·31 | 9·51 | 4·17 | ·76 | ·120 | 1513 | 6·6 |
| 52 | Whole Cape Province | 9·85 | 9·44 | 6·03 | 60·86 | 10·20 | 3·62 | ·56 | ·102 | 1523 | 7·9 |

For comparison with the above results the following figures have been compiled from the fourth (1903) edition of König's "Chemie der menschlichen Nahrungs und Genussmittel," Vol. 1, pp. 532, 533:—

| Number of Samples. | Name of Country. | Water. | Proteins. | Fat. | Digestible Carbo-hydrates. | Fibre. | Ash. | Fuel Value: Calories per pound. | Nutrient ratio. |
|---|---|---|---|---|---|---|---|---|---|
| 109 | Middle and North Germany | 13·03 | 10·14 | 4·54 | 58·62 | 10·40 | 3·27 | 1434 | 6·8 |
| 42 | South and West Germany | 13·20 | 11·38 | 5·23 | 55·87 | 10·97 | 3·34 | 1435 | 5·9 |
| 34 | Austria-Hungrry | 12·62 | 11·37 | 5·83 | 56·00 | 10·96 | 3·22 | 1462 | 6·1 |
| 122 | France ... ... | 13·92 | 9·29 | 5·74 | 59·31 | 8·49 | 3·25 | 1480 | 7·7 |
| 7 | America ... ... | 11·27 | 11·06 | 4·58 | 61·01 | 9·28 | 2·80 | 1497 | 6·4 |
| 233–231* | Various ... ... | 12·81 | 10·25 | 5·27 | 59·68 | 9·97 | 3·02 | 1486 | 7·0 |

Before going any further I would just briefly explain what is meant by the last two columns in each of the above tables. The animal body requires food for two principal purposes. The body, like a machine, is constantly being worn down—as fast as it wears away it has to be built up again and its waste repaired. This is the first function of food. But food is also needed to furnish muscular and other power for the work that the body has to do and to furnish heat for keeping the body warm. Just as a steam engine is kept going by means of its fuel so also fuel is necessary for the body. In both cases the slow combustion, which chemists call "oxidation," takes place. The materials that are burnt in the body are similar in nature to those

* The water percentage is an average of 233; the other figures are averages of 331 analyses.

which are used as fuel in a machine driven by heat-power. In both cases it is the oxidation of the carbon contained in the fuel that gives rise to the heat, and in food the chief fuel ingredients are the fats and carbohydrates, and so to some extent are the proteins, although their chief function is to furnish energy and to build up tissues. Now, when any substance is burnt it gives off just as much heat whether it be burnt rapidly in a flash or slowly in the animal body, and the amount of heat that any chemical substance is capable of affording, and so the amount of warmth that can be gained by burning it can be measured—although not quite so easily—as we can weigh out the quantity of sugar in a 200-lb. bag. The sugar is weighed out in pounds, the heat is measured in calories, and a calorie means the amount of heat that is capable of raising the temperature of a pound of water by four degrees Fahrenheit.* The "fuel value" of a substance then is the amount of heat, expressed in calories, that it would give out either when burnt or when oxidized more slowly within the animal body. Until it is so oxidized its value as fuel remains dormant just as the value of a bank note is latent until the note is cashed. By delicate experiments, into the details of which it is not necessary to enter now, the fuel values of a pound of such substances as proteins, fats, and carbohydrates have been determined. These fuel values of course differ. For instance, different kinds of fats have different fuel values: a pound of sugar differs in fuel value from a pound of starch, although both sugar and starch are carbohydrates, and, moreover, there are different kinds of sugar and different sorts of starch. In the above tables the physical energy capable of being imparted to the body by food is based on the assumption that the fuel value of a pound of either protein or carbohydrates (excluding fibre) is 1820 calories, and that the fuel value of a pound of fat is 4040 calories.† As Dr. Atwater says:—

> The fuel value of food obviously depends upon the amounts of actual nutrients, and especially upon the amount of fat it contains. Thus a pound of wheat flour, which consists largely of starch, has an average fuel value of about 1625 calories, and a pound of butter, which is mostly fat, about 3410 calories. These are only about one-eighth water. Whole milk, which is seven-eighths water, has an average fuel value of 310 calories per pound: cream, which has more fat and less water, 865 colories: and skim milk, which is whole milk after the cream has been removed, 165 calories.

Now, in the tables, it will be seen that the fuel values of the Cape oats are higher than those of the northern countries. The reason is to be found in the smaller proportion of water and the larger amounts of nutriment, principally of fat, in the South African oats.

Although the grain, in its natural condition as we use it to feed our stock, contains the proportions of water above shown it may nevertheless serve a useful purpose to compare the composition of Cape with typical European and American oats on a water-free basis. Such a comparison will show how the dry substance of the grain is made up in each case. This is done, by way of illustration, in the following table:—

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* Such a "calorie" is equivalent to 10 k. or 1000 gramme calories.

† See Atwater: "Principles of Nutrition and Nutritive Value of Food." U.S. Department of Agriculture Farmers' Bulletin No. 142, 1902, p. 12.

| Country. | Proteins. | Fat. | Digestible Carbo-hydrates. | Fibre. | Ash. | Fuel Value: Calories per pound. |
|---|---|---|---|---|---|---|
| Middle and North Germany ... | 11·66 | 5·22 | 67·40 | 11·96 | 3·76 | 1649 |
| America ... ... ... ... | 12·46 | 5·16 | 68·76 | 10·46 | 3·16 | 1687 |
| Cape Province ... ... ... | 10·48 | 6·69 | 67·51 | 11·31 | 4·02 | 1689 |

The Cape grain in its natural state therefore owes much of its higher fuel value to the fact that it contains less water or, to put it in another way, the Cape oat has its nutriment in more concentrated form.

In addition to the analyses carried out in the Cape laboratories, eight samples of Cape-grown oats were sent to England in 1910 for analysis in Dr. Bernard Dyer's laboratory. To Dr. Dyer's results, which are tabulated below, I have added calculations of the fuel values and nutrient ratios arrived at by the process above detailed.

| District. | Water. | Proteins. | Fat. | Digestible Carbo-hydrates. | Fibre. | Ash. | Fuel Value: Calories per pound | Nutrient ratio. |
|---|---|---|---|---|---|---|---|---|
| Alexandria ... ... ... | 10·99 | 10·69 | 6·47 | 58·82 | 10·07 | 2·96 | 1526 | 6·9 |
| Caledon ... ... ... | 10·81 | 7·79 | 6·91 | 60·85 | 9·61 | 4·03 | 1528 | 9·8 |
| Humansdorp ... ... ... | 10·80 | 9·00 | 7·22 | 57·85 | 11·00 | 4·13 | 1508 | 8·2 |
| Malmesbury ... ... ... | 10·21 | 8·31 | 7·08 | 60·11 | 10·57 | 3·72 | 1531 | 9·2 |
| Malmesbury ... ... ... | 10·31 | 7·44 | 7·10 | 60·72 | 10·50 | 3·93 | 1527 | 10·3 |
| Malmesbury ... ... ... | 10·00 | 9·06 | 7·65 | 57·49 | 10·91 | 4·89 | 1520 | 8·2 |
| Malmesbury ... ... ... | 10·28 | 8·22 | 7·17 | 61·15 | 9·53 | 3·65 | 1552 | 9·4 |
| Caledon ... ... ... | 10·79 | 7·90 | 7·31 | 60·18 | 10·00 | 3·82 | 1534 | 9·7 |
| Average ... ... ... | 10·52 | 8·55 | 7·11 | 59·65 | 10·27 | 3·89 | 1528 | 8·8 |

Here, again, we find the fuel value of the Cape oats higher than that of the European analyses quoted by König.

Respecting the columns headed "Nutrient ratio" in the foregoing tables a word of explanation is necessary. Two classes of solid food have been referred to above—the proteins, which may be shortly described as "muscle forming," and the fats and carbohydrates as "heat giving." The nutrient ratio is the ratio of the former to the latter of these two classes, and the figures in the last column indicate the weights of fuel ingredients present in the oats for every pound of protein that it contains; the ratio is therefore that of the protein to the carbohydrates plus two and a quarter times the fat, since one part of fat is approximately equal in fuel value to two and a quarter parts of carbohydrates.*

From their relative nutrient ratios we see that, while the Cape oats contain smaller quantities of proteins or nitrogenous constituents, yet, relatively to the amount of proteins which they contain, they have larger proportions of fuel ingredients than the European oats whose analyses are tabulated above.

* $1820 \times 2\frac{1}{4} = 4095$.

Reverting for a moment to the mineral or ash constituents of Cape oats, the percentages of lime shown in the fifty-two analyses in the second of the foregoing tables is quite normal. Wolff * quotes 10 per cent. as the normal proportion of lime in oat grain, so that here the first charge against the South African oats seemed to be groundless. It was next asserted that, if the lime percentage was normal, that of the phosphoric oxide was not, and here, *at first glance*, there appeared to be some justification. Wolff gives .68 as the normal percentage of phosphoric oxide. König† gives thirty-four analyses of the mineral constituents of European oats in which the percentages of phosphoric oxide range from .65 to 1.05 and average .83. Sibson‡ gives .67 as the percentage of phosphoric oxide in oat grain. It has been argued that this seeming deficiency of phosphoric oxide in the Cape oats is of much less account than would appear to be the case, and for the following reason. The function of both lime and phosphoric oxide in the fodder is to form bone material, and bones need only 85 pounds by weight of phosphoric oxide for every 100 pounds of lime that they take up. In other words they need *less* phosphoric oxide than lime. But all oats provide far *more* phosphoric oxide than lime, and even in the Cape oats, whose lime has been already shown to be normal, although there may be less phosphoric oxide than in the oats of other countries, still, compared with their lime, they afford a superabundance of phosphoric oxide. A reference to the table of the fifty-two analyses will show that the Cape oats provide for every 100 pounds of lime about 560 pounds of phosphoric oxide. That is to say, they contain, *if they are considered merely as bone formers,*§ far too little lime to balance the phosphoric oxide. But, in this respect, *Cape* oats do not stand alone; it is a common property—a common *failing*, if we like to put it so—of *oat grain wherever it is grown*. The deficiency of lime must therefore be made up to the animal in all cases, whether it be fed on Cape-grown oats or on the oats of other lands. This was pointed out by Dr. Lewis in his article in Vol. 33 of the *Cape Agricultural Journal* (p. 366) and again emphasized in my Annual Report for 1909 (p. 147).

## WHEAT.

During the year 1909 a series of analyses of thirty-seven samples of Cape-grown wheat was undertaken, and, along with them, analyses of six imported wheats. The detailed results of the analyses were, as already stated, published on page 148 of my report for the year mentioned; the average results were as follows:—

* "Praktische Düngerlehre," p. 217.

† Op. cit., pp. 525, 526.

‡ "Agricultural Chemistry," p. 150.

§ In bones phosphoric oxide exists in what is called an inorganic form, namely as calcium phosphate. In addition it is intimately associated with the formation of albumen, and is essential for the maintenance of brain and nervous tissue; in this form it exists as *organic* phosphorus, a phase of its functions which will be discussed later when dealing with maize.

| | Water. | Proteins, N × 6·25. | Fat. | Digestible Carbo-hydrates. | Fibre. | Ash. | Fuel Value: Calories per pound. | Nutrient ratio. |
|---|---|---|---|---|---|---|---|---|
| Cape wheat ... ... | 11·97 | 10·24 | 1·83 | 72·13 | 2·33 | 1·50 | 1573 | 7·4 |
| Imported wheat* ... | 11·87 | 14·68 | 1·89 | 67·74 | 2·30 | 1·52 | 1576 | 4·9 |

The thirty-seven samples of Cape Province wheat may be grouped in districts thus:—

| District. | Water. | Proteins. | Fat. | Digestible Carbo-hydrates. | Fibre. | Ash. | Fuel Value: Calories per pound. | Nutrient ratio. |
|---|---|---|---|---|---|---|---|---|
| Cape (Durbanville), Nos. 1–21, 28–30, 37 | 11·83 | 10·26 | 1·92 | 72·21 | 2·27 | 1·50 | 1579 | 7·4 |
| George, Nos. 22–27 ... | 12·51 | 10·80 | 1·57 | 71·18 | 2·45 | 1·49 | 1555 | 6·9 |
| Paarl, Nos. 31–36 ... | 12·01 | 9·59 | 1·71 | 72·73 | 2·42 | 1·55 | 1567 | 8·0 |

These figures may be compared with the following results quoted by König† obtained from 948 analyses of wheat grown in Germany, Austria-Hungary, Russia, Great Britain, France, Denmark, Spain, North Africa, Asia, Australia, and North America:—

| Water. | Proteins. | Fat. | Digestible Carbo-hydrates. | Fibre. | Ash. | Fuel Value: Calories per pound. | Nutrient ratio. |
|---|---|---|---|---|---|---|---|
| 13·37 | 12·03 | 1·85 | 68·67 | 2·31 | 1·77 | 1543 | 6·1 |

Wheat, therefore, when compared with oats, contains considerably less fat and considerably less fibre. The ash constituents of wheat are also somewhat less than is the case with oats. On the other hand, the digestible carbohydrates are much higher in wheat, and the proteins are also higher than in oats.

Comparing Cape with the average of the six imported wheats analysed in the Capetown Laboratory, there is not that difference in moisture content which we noted in the case of oats; the difference is only seen on comparing the former with the results published by König. Nor is there any perceptible difference between the proportions of fat in Cape wheat and in wheat from other countries. Cape wheat is, however, distinguished from overseas wheat in having a greater percentage of carbohydrates and a smaller percentage of proteins, and the net result of this is that, while the fuel value is about the same as in the case of wheat grown elsewhere, the nutrient ratio is distinctly higher.

* One French and five Australian.

† "Chemie der menschlichen Nahrungs und Genussmittel," p. 461.

We may also, as in the case of the cats, make a comparison between Cape wheat and that of other countries on a water-free basis. Thus the following figures are arrived at:—

| Description. | Proteins. | Fat. | Digestible Carbo-hydrates. | Fibre. | Ash. | Fuel Value. |
|---|---|---|---|---|---|---|
| Imported wheat* .. | 16·66 | 2·14 | 76·86 | 2·61 | 1·72 | 1788 |
| König's compilation ... | 13·88 | 2·14 | 79·27 | 2·67 | 2·04 | 1781 |
| Cape Province ... | 11·63 | 2·08 | 81·94 | 2·65 | 1·70 | 1787 |

Again, we see that the fuel values are more nearly equal in the absolutely dried grain than in the grain in its natural or air-dry state.

## BARLEY.

In connection with barley, a statement had been made that what was called "the inferior grade of barley grown at the Cape" was not suitable for brewing purposes, and therefore it was necessary to import barley from overseas unless sugar were permitted to be substituted to some extent for malt in the brewing of beer. It is not proposed to discuss this question here; that was done, as fully as requisite, in my article on "The Composition of Cape Barley" in the issue of the *Union Agricultural Journal* for April, 1912,† and the present purpose is rather a discussion of the *fodder* value of cereals.

In 1909 six Cape-grown barleys were analysed in the Capetown Laboratory, some of these having been grown from Cape, and others from imported, seed. Their average results were as follows:—

| Water. | Proteins, N × 6·25. | Fat. | Digestible Carbo-hydrates. | Fibre. | Ash. | Fuel Value: Calories per pound. | Nutrient ratio. |
|---|---|---|---|---|---|---|---|
| 9·42 | 8·05 | 1·77 | 72·49 | 5·79 | 2·48 | 1537 | 9·5 |

Two years later further investigations were undertaken and forty-seven samples of Cape-grown barley analysed along with nine of imported seed. The results obtained from the Cape seed averaged as follows:—

| No. of Samples. | Division. | Water. | Proteins, N × 6·25. | Fat. | Digestible Carbo-hydrates. | Fibre. | Ash. | Phosphoric Oxide. | Lime. | Fuel Value: Calories per pound | Nutrient ratio. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | Malmesbury ... | 11·06 | 8·69 | 1·76 | 70·04 | 6·03 | 2·42 | ·66 | ·063 | 1504 | 8·5 |
| 6 | Caledon ... | 12·35 | 7·69 | — | — | 6·25 | 2·03 | ·45 | ·056 | — | — |
| 4 | Paarl ... ... | 10·99 | 7·94 | — | — | 5·93 | 2·24 | ·64 | ·103 | — | — |
| 6 | Tulbagh ... | 10·92 | 8·06 | 1·85 | 70·86 | 6·17 | 2·14 | ·58 | ·101 | 1511 | 9·3 |
| 7 | Worcester ... | 10·86 | 8·38 | 1·52 | 70·40 | 6·39 | 2·45 | ·69 | ·066 | 1495 | 8·8 |
| 6 | Robertson ... | 10·73 | 10·19 | 1·59 | 68·53 | 6·26 | 2·70 | ·72 | ·072 | 1497 | 7·1 |
| 7 | Cathcart ... | 11·82 | 10·06 | — | — | 5·97 | 2·65 | ·59 | ·129 | — | — |
| 47 | Whole Province | 11·24 | 8·75 | 1·69 | 69·99 | 6·14 | 2·39 | ·62 | ·082 | 1501 | 8·4 |

* One French and five Australian.

† Vol. III, pp. 516-529.

In the final averages of the above table the figures for fat and digestible carbohydrates represent only the thirty samples in respect of which determinations of those constituents were available for comparison.

The averages obtained from the nine imported barleys were:—

| Water. | Proteins. N × 6·25. | Fat. | Digestible Carbo-hydrates. | Fibre. | Ash. | Phos-phoric Oxide. | Lime. | Fuel Value: Calories per pound. | Nutrient ratio. |
|---|---|---|---|---|---|---|---|---|---|
| 12·79 | 9·81 | 1·95 | 69·47 | 3·71 | 2·27 | ·88 | ·087 | 1521 | 7·5 |

The usual composition of barley is given in the following averages quoted by König* of 510 analyses of samples from various parts of Europe and America, and comprising in that number also eleven samples from Africa and Asia:—

| Water. | Proteins, N × 6·25. | Fat. | Digestible Carbo-hydrates. | Fibre. | Ash. | Fuel Value: Calories per pound. | Nutrient ratio. |
|---|---|---|---|---|---|---|---|
| 12·95 | 9·68 | 1·96 | 68·51 | 4·40 | 2·50 | 1502 | 7·5 |

The fat and digestible carbohydrates of barley, therefore, approximate in amount to those of wheat, but barley—and Cape barley in particular—contains rather less proteins and more fibre. Here again we see the Cape-grown cereal lower in protein than the corresponding products of other countries, and again the former seems to contain less water. The Cape barley appears, however, slightly lower in fuel value.

The following table compares, on a water-free basis, the forty-seven Cape-grown barleys with the nine imported barleys analysed in the Capetown Laboratory, and with the 510 of König's compilation:—

| Description. | Proteins. | Fat. | Digestible. | Fibre. | Ash. | Fuel Value. |
|---|---|---|---|---|---|---|
| Imported barley ... | 11·25 | 2·24 | 79·66 | 4·25 | 2·60 | 1744 |
| König's compilation | 11·12 | 2·25 | 78·70 | 5·05 | 2·87 | 1725 |
| Cape Province ... | 9·86 | 1·90 | 78·85 | 6·92 | 2·69 | 1691 |

* "Chemie der menschlichen Nahrungs und Genussmittel." p. 509.

*(To be continued.)*

# The Wattle Bagworm

(*Chalioides junodi* Heylaerts).

By Claude Fuller, F.E.S., Division of Entomology.

(*Continued from page* 33.)

## The Life Cycle of the Bagworm.

The Bagworm is a single-brooded insect, that is to say, it takes twelve months to complete its development. It begins its life in the spring of each year and completes its cycle of development in the early spring of the year following. In this respect it resembles our well-known red-wing locust and differs from that equally-well-known pest, the maize stalk-borer, of which there are two broods in the year, or the grain weevil of which there are quite a number of generations.

At whatever stage we start to study the Bagworm to that point we return, and, because it is a single-brooded insect, what we find occurring at one time of the year is to be found recurring about twelve months later. It is therefore possible to chart the development on a circular calendar, and in the accompanying diagram I have given a Bagworm calendar which shows the phases of the insect for each month of the year. We find, upon reference to the diagram, that after a considerable spell of inactivity on the part of the parents the young are produced and that the parents die off.

The infantile caterpillars soon encase themselves, start feeding, and continue to feed for the better part of six months. Then, like to their parents, they rest from their labours and ultimately achieve those transformations common to most insects which bring them to maturity. All the feeding is done in the larval or caterpillar stage, and the adults feed not at all, nor are they, for the matter of that, provided with organs of nutrition. It is at the end of summer that the Bagworm ceases feeding (March-April).(27) When replete the male caterpillars are conspicuously smaller than the females, and, as often as not, they can be separated by the much smaller proportions of the bags they inhabit. At this period the insects display a desire to associate themselves together, so that it is not at all unusual to find a number of bags fixed closely upon a twig or grouped in bunches. This social tendency is not common to all, for many remain isolated, but about 50 per cent. will be found exhibiting it. The insects now attach their bags tightly to the twigs webbing them on and closing the opening through which they erstwhile took their outlook upon life. In the course of this process a ligature of silk is encircled about the supporting stem, and very frequently, when growth again starts, these

(27) This period is governed by the seasonable influences of spring. That is to say, the earlier the young hatch from the eggs the sooner the caterpillars become replete. Thus in some seasons feeding may finish with the advent of February or March or it may continue into April. Again, where the hatching period has extended over six to eight weeks, so is the finish of the feeding season extended.

tied up twigs become much aborted. They are very apt to break off in the wind because the silk ligatures cause a marked constriction. This form of damage is fortunately altogether negligible and seldom happens to any extent. Ordinarily, the effect is similar to that which so often occurs when nurserymen's tags are not removed after plants are set out.

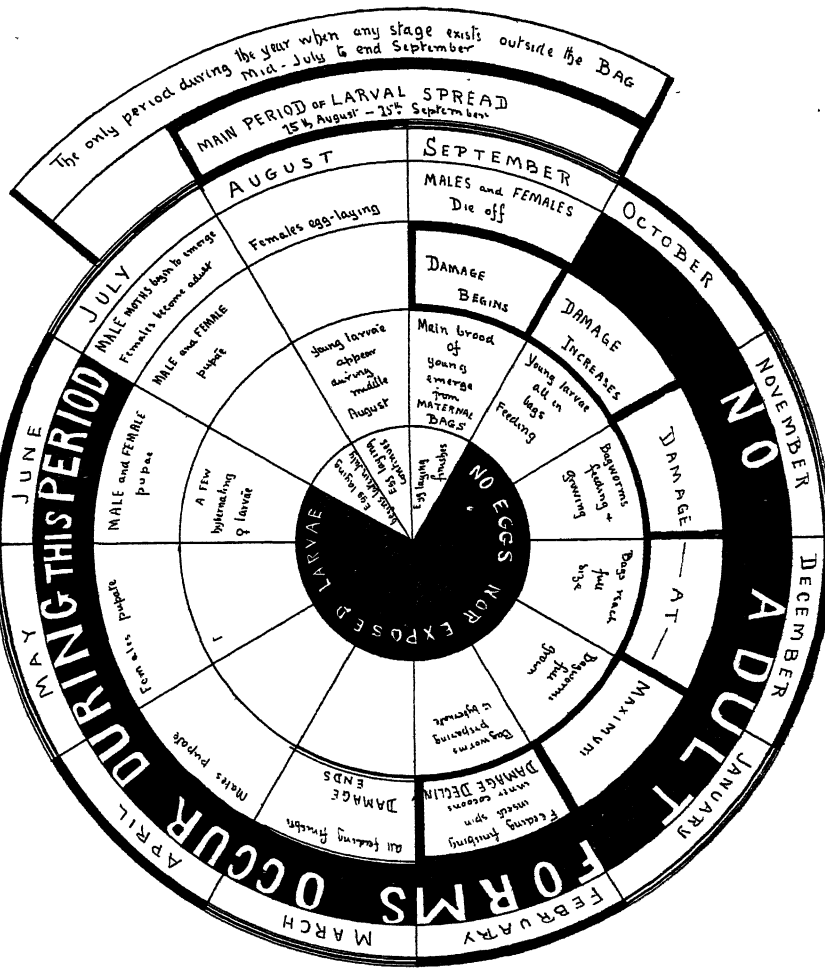


*Plate No. XII.*

The webbing up accomplished, the caterpillar moults its skin and then weaves an inner cocoon. This is done almost immediately by the male, and, later, by the female. The inner cocoon is in the form of a tube, and is attached to the walls of the bag at top and bottom. At the top it is closed, but at the bottom it is open and continues into the permanent lower opening of the bag through which the caterpillar formerly ejected its faeces.

The inner cocoon completed, the male caterpillar turns about so that its head is towards the lower opening of the bag, and then

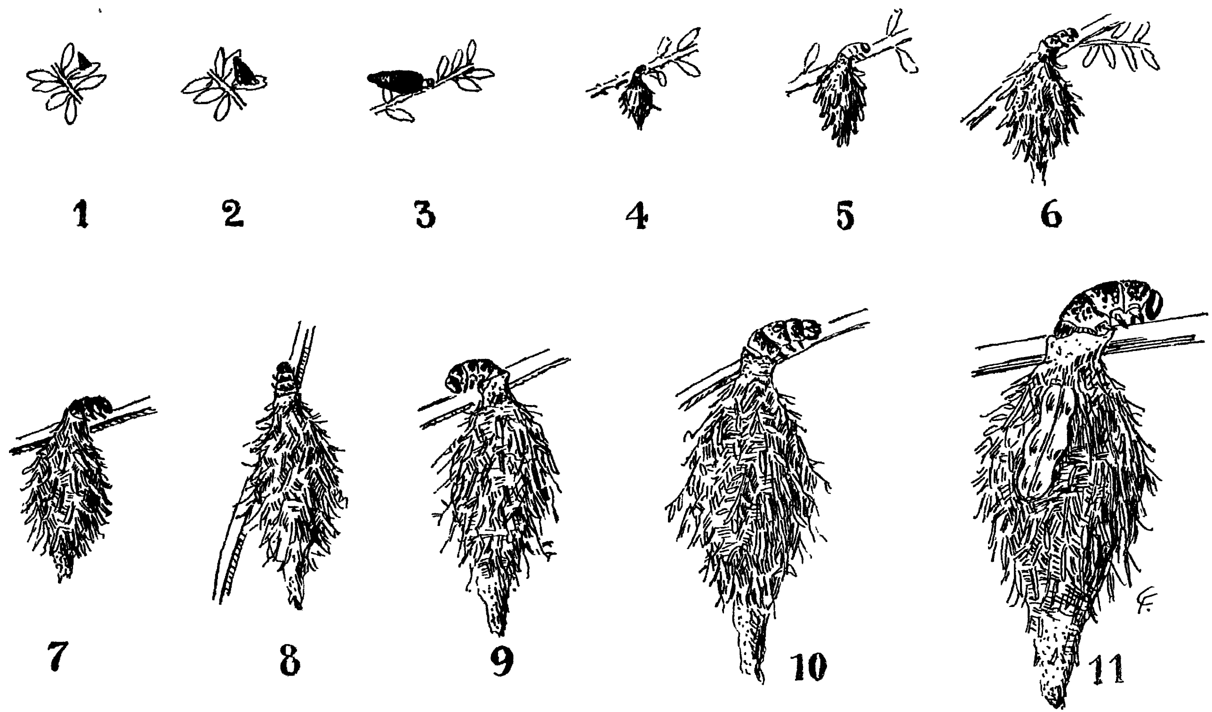


*Plate No XIII.*

THE WATTLE BAGWORM.

Illustrating how, as the caterpillar increases in size, the bag is constantly being enlarged.

pupates.(28) Subsequently (June-July) the female goes through the same procedure and pupates.

So far as the caterpillar stage is concerned not only are the habits of the two sexes alike, but both present the same appearance. In other words, they are typical caterpillars furnished with hard horny heads provided with chewing mouth parts or jaws and having the usual appendages. Their bodies are black, or almost so, and soft and fleshy, except for the thoracic segments which, like the head, are horny and present tortoiseshell markings. They possess six conical and segmented legs; these they use in crawling over their food plant. They have also a full complement of prolegs, or cushion-like feet, by which they cling tenaciously to the inner lining of their bags, and with which, of course, they pull the body into the security of the bag when disturbed or frightened. Whilst speaking on this point, it is to be noticed that the Bagworm, when feeding or transporting itself and its home from point to point, exposes but a small region of the body and clings to the surface it is progressing along by its true legs. When disturbed it seems to withdraw instantly into its bag and one is rather puzzled as to why it does not fall, domicile and all, to the ground.(29) When feeding, however, the lip of the bag is always fastened by several silk strands so that, as the caterpillar withdraws, it hangs, not very securely naturally, but sufficiently so to prevent its falling.

Once the pupa stage is reached, striking differences are apparent between the chrysalis of the male and that of the female. The former is a normal moth chrysalis, that is, the exterior sculpturing reveals the anatomy of the future moth. One can recognize readily the various regions of the insect body and the parts where wings, legs, and antennæ are forming. The female chrysalis is quite different. We find a segmented, spindle-shaped organism which might be a concertina for all the resemblance it bears to the pupa of the male, and nowhere is there any indication of a differentiation between the head, thorax, and abdomen of a typical adult insect. Neither do we see any sculpturings suggestive of wings, legs, nor antennæ, and but the meagrest traces of the blunt chewing head and large conical legs of the caterpillar remain.

About a fortnight after the females enter upon the chrysalis stage the male moths emerge from the bags and the females also become sexually mature. As the time arrives for its transformation the male chrysalis, which always responds by active movements to any disturbing stimulus, works itself half out through the lower opening of the bag. Presently the shell cracks along the masked antennæe and from out of the shell the moth escapes. In this phase the male Bagworm is a fussy excitable little creature. It seems, indeed, a veritable bundle of nerves. Its body is about half an inch in length, and across its

(28) In my earlier observations the first pupae were found in May. Miss Pegler records finding many male pupae in April, 1909. In 1911 the first male pupa was found on the 7th April.

(29) Our natives have a quite euphonious and applicable name for all kinds of bag and basket worms. It is Mahambanendhlwana, which means he who carries his home about with him. All bag and basket worms are looked upon as deadly poisonous by the natives of Natal, Zululand, and the Transvaal, and this belief is shared by many Europeans. There is neither rhyme nor reason for it, and birds and small mammals feed with impunity upon the Wattle Bagworm. See also p. 605, *Cape Agricultural Journal*, 1905; p. 837, *Natal Agricultural Journal*, vol ix; and p. 348, Report Director of Agriculture, Transvaal, 1904-05.

*Plate No XIV.* THE WATTLE BAGWORM.

Bagworms on Wattle (*Acacia mollissima*); natural size. (Original.)

expanded wings it measures 1 1-5 inches. It is by no means a large moth nor is it a moth to attract attention. In appearance it may be said to resemble a black or deep brown bee. Its body is clothed with a dense velvet pile like to the bodies of most moths, but its wings are practically clear and glossy, like to those of a bee or a fly. In this respect it is abnormal when ranged alongside the majority of moths, insects which obtain their technical name, Lepidoptera (scaly-wings), from the tiling of scales which, placed like those upon a fish, clothe both upper and lower surfaces of the wings.(30) This moth is not capable of prolonged flights; the furthest I have induced one to make any sustained flight was fifteen feet, and then upon a declining plane. All the while it agitates its wings, just as does the male moth of the common silkworm—a creature well known to be incapable of flight. It crawls rapidly about and darts here and there for short distances; flights that look more like jumps than anything else. To anticipate a little I may say that all this excitement is not, as one might expect, so much a form of courtship and the seeking of a spouse as it is a ready alertness to respond to a love message borne, I can but guess how, from the female.

The arrival of the female at maturity is signalized by the rude rupture of the apex of the chrysalis case, and from which she then protrudes a hardened cone which we must perforce term her head. This female creature is to the male an anticlimax. Except for the conical apex, which bears no resemblance to a head, possessing neither eyes nor appendages, her body is a soft flabby bag, full of eggs ready to be fertilized. Further, it is white and naked except for a large ruff of scales which more or less completely encircles the tail-end of her body. Strictly speaking, she inhabits her chrysalis shell. Soon after having reached maturity she works her body into the tubular lower opening of the bag and coyly "peeps" with her apology for a head upon the outer world. What message she may send by this action we can only guess. Doubtless, however, a perfume is wafted abroad, imperceptible to us, but acting magnetically upon any male that may be near-by. Aided by smell, and, perchance, also by sight, the male soon alights upon the bag of his bride elect. Then the female at once shyly retreats and ensconces herself within her pupal shell. Almost immediately after mating the female begins her egg laying.(31) The eggs are packed closely behind her in the pupa shell, involved in a

(30) When it first escapes from the chrysalis shell the male Bagworm has a spattering of scales upon the wings mostly placed loosely along the veins: but owing to the violence with which it is always agitating these organs, the bulk of these are quickly displaced.

(31) As a matter of scientific interest the act of copulation has been carefully observed and for the same purposes is here described. After alighting upon the bag the male still agitating its wings backs downwards searching with the end of his abdomen for the lower entrance to the bag, which collapsing slightly after the retiral of the female he does not always easily discover. Upon doing so, the end of the abdomen is inserted until the whole of it is within the opening. The female is now some distance within, and, moreover, the head being presented towards the orifice, the genitilia are the furthest removed. By a series of muscular efforts which may last for the better part of half an hour the abdomen of the male is slowly and somewhat telescopically extended. The hardened segments start apart, and the connective tissue is enormously extended so that it becomes a thin clear membrane through which the enormous muscular action can be seen as through a pane of glass. This extension of the abdomen finds a parallel in that which occurs in the case of the female locust when depositing her eggs in a boring in the soil. The abdomen is passed up between the body of the female and the wall of the chrysalis shell, the latter serving both a directing purpose and a purchase. whilst the female lies inert and withdrawn as far as possible within the shell.

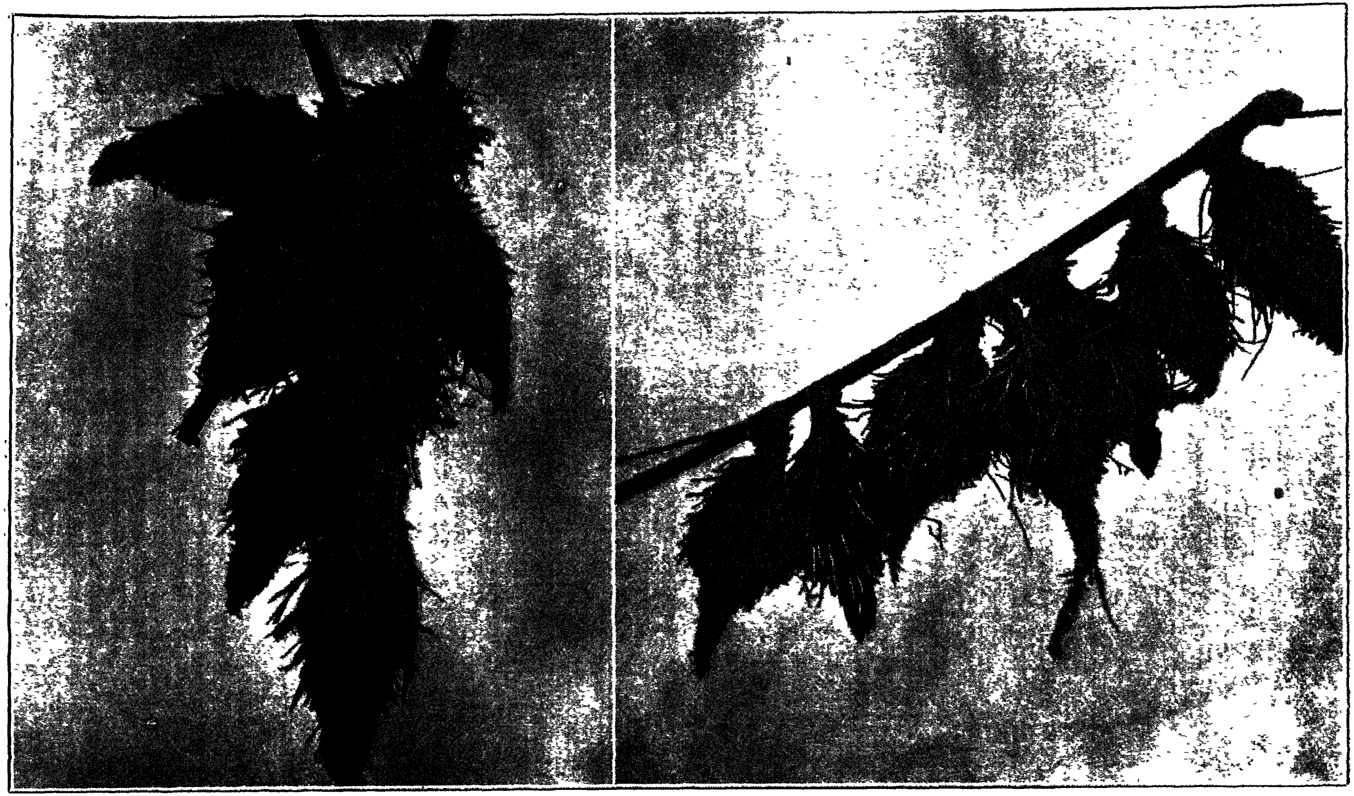

*Plate No. XV.* THE WATTLE BAGWORM.

Showing how the insects cluster together on the approach of winter. This social instinct is no doubt to assist in successful mating, as the male moths cannot fly very far. (Original.)

mass of waxy-like secretion and mixed with the scales once ornamenting the apex of the maternal abdomen. Some 600 eggs are laid; the number may be more or less in accordance with the size of the female. Actual counts of eggs (1911 and 1912) ranged from 500 to 750 per female. Oviposition finished, the female dies, and her shrivelled body remains applied near to the last eggs she laid.([32]).

### EMERGENCE AND DISPERSAL OF THE YOUNG.

Very shortly the eggs hatch, the young leave the maternal bag, leaving behind them the dried and shrivelled remains of their parent. The advent of the young into the world is attended by a remarkable phenomenon which I have frequently observed under artificial conditions, but never, to the extent I should have liked to, under natural conditions.([33]) When the young do start feeding it is invariably upon the immature foliage at the apices of the branches. The very young upon guavas have been noted to construct the initial bags from the rind of the ripening fruit and not from the foliage. In view of this decided predilection one would expect them to crawl over the maternal bag upwards to their selected food. But nothing of this sort occurs. Certainly it never occurs in breeding-cages and the like, and the evidence I have shows it not to occur in the field. Instead of doing this the insects drop from around the base of the bag supported by gossamer strands and sway about in the air. No matter how high the maternal bag is suspended the young caterpillar will go on dropping until it comes in contact with some object on a lower plane.

([32]) The female after egg-laying never leaves the bag. As a matter of fact she is absolutely incapable of such an action, and her shrivelled skin may be found after the eggs have hatched and the young departed. The young as certainly do not feast upon this remnant. This is said to be so of some species of Bagworm, but whilst all things are possible, the statement is as unacceptable on the common-sense basis as is that to the effect that after oviposition the female does leave the bag and fall to the ground and die.

In the course of my observations I have noted that when females are separated so that no male can reach them they always become over-excited in their efforts to attract a male, and protrude the body further and further out of the bag. Frequently this is done to such an extent that the creature loses its purchase and falls to the ground. Such females, though palpitating with life, have no attraction for active males that may be confined with them. Often, too, they will extrude a small quota of eggs which speedily become desiccated. In other cases the female deposits in the usual position her complement of eggs. Both these features I have noted, from extensive examinations, to occur to no small extent under natural conditions and they are important factors in restraining the full regenerative potentialities of this insect. Because pathenogenisis is said to occur among the Psychidae unfertilized eggs have been kept under observation, but in no case has any evidence been adduced to indicate its occurrence in the case of the Wattle Bagworm.

([33]) Naturally, in rearing insects in confinement, one observes many a behaviour under exceptional circumstances. Thus, it has been found that the young, from a bag suspended 15 feet, will make a elear drop to the floor, and all from the bag will do this so that a regular column of silken strands is formed.

When the drop is short—a few inches—the insects will wander off and climb near-by objects from which they will again drop. Where a large number of maternal bags were placed upon a table the insects wandered over its surface in the direction of the light and made a perfect veil of gossamer at one end of the table by climbing and dropping from objects in their way. In the room upon reaching the wide open space of the floor they seem to recognise a limit to their wanderings and keep to their silken strands, where thousands will die rather than wander further afield.

Upon wattle trees felled in September the young go to the highest points and there weave a canopy of silk, over which they wander and whereon they die, making no effort to crawl afield to the bases of near-by trees presenting an abundance of food. This effort, which has been observed over several acres of thinnings, is most reminiscent of the futile and wasted effort of a silkworm to weave its cocoon on a plate or flat surface from which it cannot escape.

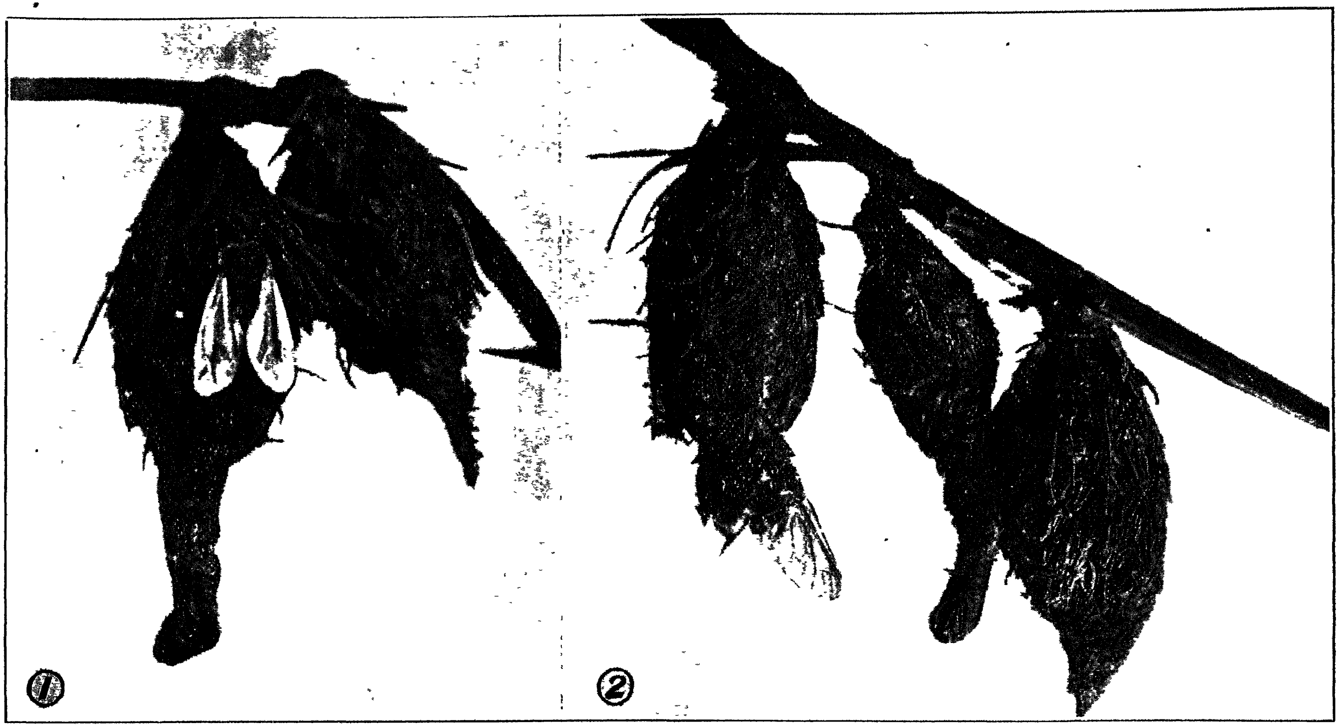

*Plate No. XVI.*

THE WATTLE BAGWORM.

1. Illustrating the emergence of the male. 2. The meeting of the sexes. (Original) Note the proximity of a male bag to that of a female in these two instances.

This accomplished, it ascends its strand again and thereon disports itself for a day, or perchance more, making no attempt to feed however conveniently food may be placed. Now this behaviour is not at all common to newly hatched caterpillars of other sorts when already in close association to a food supply, and it must be looked upon as very abnormal. It is more natural to such insects to start feeding straight away however limited the supply may be, and when it is insufficient for the number of mouths present the death of the lot as likely as not ensues.

No other interpretation can be placed upon this remarkable behaviour than that it is intended to aid in the dispersal of the species. Numerous flying insects and birds frequent our native thorns; equally, many frequent wattle plantations. Undoubtedly some are attracted by the food supply exhibited in these colonies of young worms. Now the silk strands are not only most fragile, but they are also glutinous and cling readily to any object breaking through them. Any flying insect or bird may therefore be the chance transporting agent of a brood of young Bagworms to pastures new. Nature, always prodigal of life, where the perpetuation of a species is concerned, provides an all sufficient supply to meet all the vicissitudes and emergencies arising and, in the parlance of to-day, she takes all the sporting chances. In the case of the Bagworm these are taken in preference into what to us appear "certainties." Who is there with any insight to what goes on amongst insects to say that Nature does not spread this feast of Bagworms simply that some insect or bird attracted to the board may unconsciously carry off young Bagworms to pastures new?

However this may be, it cannot be gainsaid that this infantile habit equally accounts for the unusual and great wind-spread of the species that has recently occurred. "Wind" spread because no active agents, such as birds nor insects, abound sufficiently in our plantations to account for its uniformity nor its vastness. True, the details have not been observed, but I have met with so much doubt upon the possibility thereof that I must be forgiven if I deal with the "theory" somewhat at length. Mention has already been made of the circumstances, which, to briefly recapitulate, are:—

(*a*) High gales of heated wind from the west (berg winds). These sweep over the country during the hatching season of the Bagworm. They blow from early morn till afternoon, when they drop and are succeeded by cool and milder breezes from the ocean, flowing in a contrary direction.

(*b*) The uniform infestation of large areas of trees.

(*c*) The presence of Bagworms upon seedlings but a few inches in height in open fields well removed from plantations.

The hot winds are often of great velocity and strength. Frequently they are gusty and swirling. To take a problematical case, we may imagine a number of Bagworms suspended in mid air being swept up by the gale. Now we would expect them to be carried forward from tree to tree, but it is to be remembered that after a gross infestation, which results in an innumerable supply of young, the trees are still more or less defoliated the following spring; after a dry season all the more so than after a wet one. It is not difficult, therefore, to imagine them being carried out of a plantation. In this connection it is worthy of note that despite the enormous numbers of

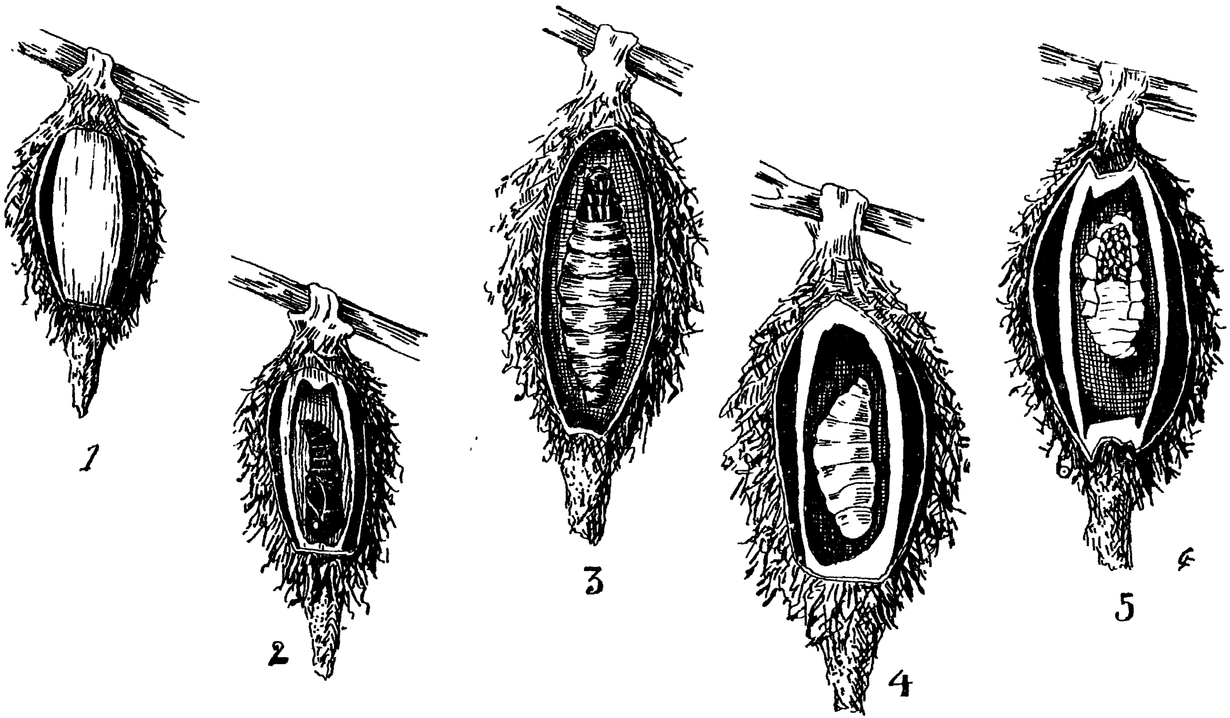


*Plate No. XVII.*

THE WATTLE BAGWORM.

1. Bag of male, opened to show the inner cocoon. 2. Inner cocoon, opened to show the male chrysalis. 3. Bag of female, showing full-grown caterpillar before weaving its inner cocoon. 4. Bag of female, opened to show chrysalis of female within an inner cocoon. 5. Female bag opened to show adult female placing her eggs in chrysalis shell.

young which were produced in two defoliated and still (November, 1912) almost bare plantations, scarcely any young Bagworms remained.(34) In short, the infestation had been swept out of them.

Added to this there is ample evidence that wind plays an important part in the dispersal of insects. Writing upon this subject Professor Sajo (35) draws attention to "the fact that insects in the air at the time the storm bursts are driven like chaff to great distances—perhaps into other countries, across rivers, lakes, and mountains; not only the species that fly but many that do not fly may thus be transported to new homes." And, again, "many aphides creep to the crowns of plants, then drop themselves at the proper moment into the current of the storm. A number of these insects land in places where there is no food for them and die. . . . Part are thrown into water, sometimes in oceans, and perish. A proportionately small number arrive at such places as may be called really favourable for their diffusion. . . . Such have a chance to multiply into large populous colonies within a small space of time and continue until their enemies find them out, etc."

The writer of the above associates this form of spread with windy thunderstorms, and in that restricted sense it may not apply to the Bagworm. It is known that electrical disturbances of the atmosphere stimulate all organisms to activity. He, however, adds: "The greater the change in the atmosphere the greater the unrest of the living being." Professor Bews remarks of Natal, (36) "In the midlands in winter months a difference of 50° F. in daily shade temperature is not at all uncommon, and at sunset the fall is extremely sudden. These sudden changes in temperature form one of the most striking features of the Natal climate." The direct application of this remark to the point of issue is the sudden increase in temperature with the rising sun when the hot Berg winds start. These conditions are sufficient to increase the activity of the insects and to produce at the same time currents of air from the plantations to secure the blowing upwards and outwards of them.

The fact that the creatures are suspended by silks which may break off and yet be of considerable length, and which can be increased in length as the creature is spun through the air, added to our knowledge of the aeronautics of spiders, gives every reason for assuming that the dispersal of young Bagworms is as natural by wind currents as by any other agency.

By the aid of silk or gossamer young spiders are able to travel long distances.

"Sailing 'mid the golden air
In skiff of yielding gossamer." (*Hogg.*)

One species of Huntsman Spider (*Heteropoda ventorius*) is practically cosmopolitan in tropical and sub-tropical regions. This wide diffusion has been attributed to ships, but Professor McCook holds that the trade winds are more responsible. Spiders floating in mid air have been seen at sea, and many observers have noted the flights of these ballooning

(34) In these instances the parent Bagworms had found sufficient nourishment to bring them to maturity, and an abnormal number had gone through their transformations.

(35) Quoted from "Winds and Storms as Agencies in the Distribution of Insects," by F. M. Webster.—*American Naturalist*, vol. xxxvi, 1902.

(36) "The Vegetation of Natal," *Annals of the Natal Museum*, 11.3 (1912), by I. W. Bews, Professor of Botany, Natal University College.


*Plate No. XVIII.* THE WATTLE BAGWORM.

1 and 2. The adult male (*Chalioides junodi*). 2. Shows the spattering of scales on the otherwise glassy wings of a freshly emerged adult. 3. The adult female egg-laying. The chrysalis shell is partly broken away to show how the eggs are deposited in it. 4. An adult female after laying her eggs. 5. The same as 3, but without the shell being broken. 6. Side view, and 7 top view of the adult female before egg-laying and removed from the chrysalis shell. (All somewhat enlarged. Original.)

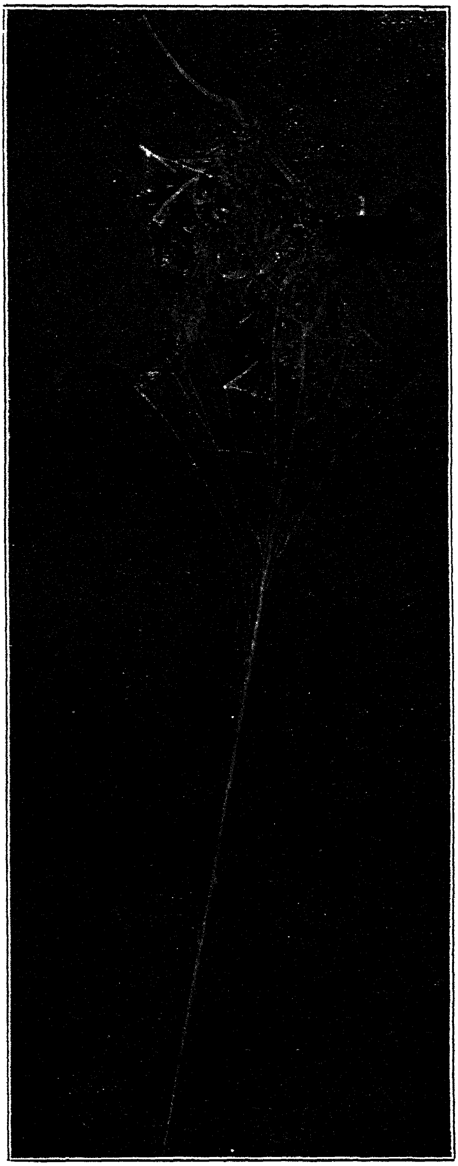

*Plate No. XIX.* THE WATTLE BAGWORM.

This photograph illustrates the silken ladder formed by the young ou emerging from the bag. Owing to a small accident the strands have become twisted together and formed a single thread.

creatures. Young spiders, whose natural homes are among the grass roots, when about to distribute themselves are found spinning strands upon grass stems or other elevated objects, such as fences and bushes. Presently they will cling to these strands with their claws, and, turning the head into the wind, lift up their bodies high upon their legs and elevate the abdomen to the utmost. From the tip of the abdomen streamers of silk now proceed, and as the air current draws upon them and carries them upwards they are increased in length until they extend into the wind for several feet. When the spider feels the pull of its kite or balloon it lets go its hold with all eight feet simultaneously and sails away.

There is one feature of Bagworm wind-spread which at first sight appears to controvert it. This I have already referred to as a general peppering of the plantation or a uniform infestation. One would naturally conclude that in cases of wind-spread a greater degree of infestation would appear on the windward edge of the plantation, and this would gradually diminish towards the leeside, more especially as such spread is from high trees to low ones. That this is not always so can be only explained by the carriage of the insects into a higher sratum of air, and their gradual and uniform fall afterwards; or, otherwise to their being borne back upon the returning breeze of the afternoon.

I do not wish to belabour this point too much as the question at issue requires more elucidation than I have been able to give it, and may be the more easily answered by some one having a full opportunity of watching the larval behaviour more closely. There is, however, a feature which I cannot pass unnoticed. The city of Pietermaritzburg lies beneath high hills to the west. These hills have been clothed with wattles for fifteen years past, but I have observed no general or gross infestation of the young plantations or other host plants in the valley and the city. Yet in the spring of 1911 two large oaks, one at the back of the Government offices and another facing St. Saviour's Cathedral, both exposed to the westerly winds, were infested with Bagworms high upon their western faces, whilst oaks near by and equally in the heart of the city, but sheltered by buildings, were not so infested. Such an occurrence we might ascribe easily enough to young Bagworms carried "like chaff before the wind," and describe the spread as more normal than that which appears to have recently become usual in the New Hanover wattle district. I can only make these instances fit in by assuming that as the main volume of insects were borne fairly high over the city, a few were raked in by the high oaks, and no returning breeze wafted the balance back again over the city.

## THE MAKING OF THE BAG.

The first event of importance in the young insect's life is the making of the small bag in which it encases itself. This it sets about before taking any nourishment. There are many insects which in their larval stages so encase themselves for the better protection of their defenceless bodies. Caterpillars doing so may be said to anticipate in their earliest stage the cocoon-spinning habit of approaching maturity. The undertaking is probably common to all Psychid larvae, and the plan of operation is doubtless always the same. The procedure

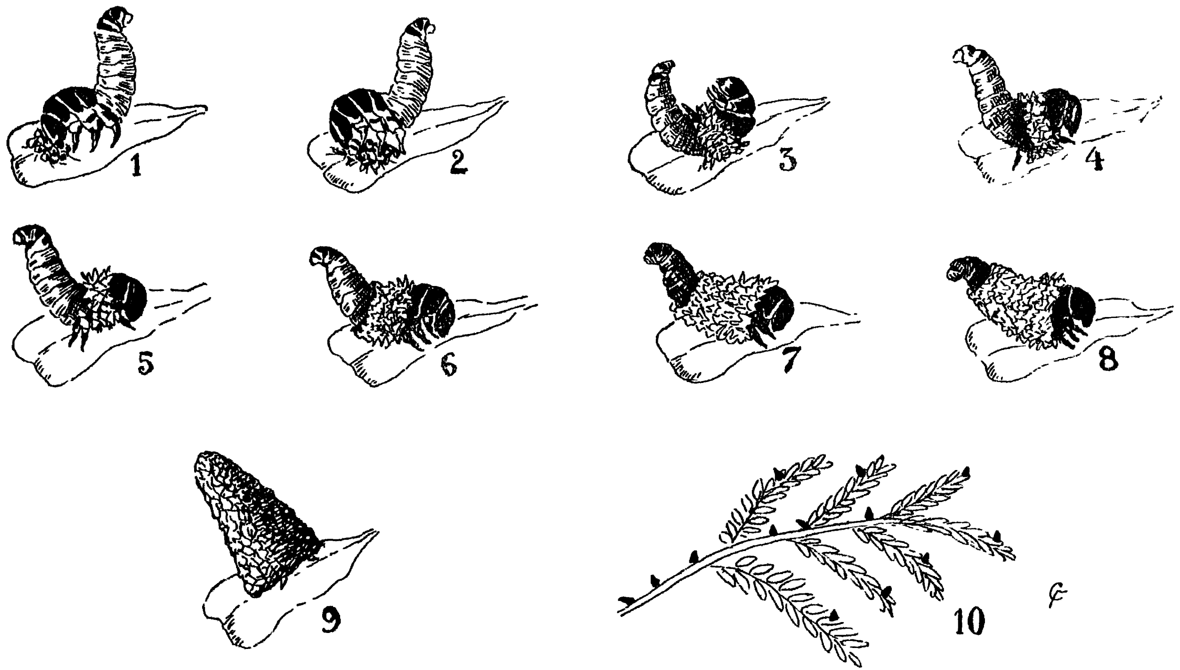


*Plate No. XX.* THE WATTLE BAGWORM.

1–9. The construction of a bag (enlarged). 10. Young bagworms taking their first meal (natural size). *Note.*—The young bagworm makes its bag as indicated in the above diagrams. It first (1) makes a pile of minute fragments bitten from the tenderest leaflets and weaves them together with silk into a strap or band fastened to the leaf surface. It then straddles this band (2) and dives underneath it (3), turning a somersault. It then rights itself (4), and completes the collar thus formed about its "neck" (5). The collar is made deeper and deeper by weaving fresh particles into the front rim (6), (7), and (8), and is pushed backwards over the body until as in (9) it is completely encased.

in the case of the American Bagworm (*Thyridopteryx ephemeræformis*) was graphically described by Riley in 1887, and the behaviour of our own species is identical. Upon several occasions I have removed caterpillars from their bags with a view to watching their behaviour. Providing they are in an active state—that is to say passing through a feeding stage—they will, given reasonable facilities, always construct a fresh bag. Their bodies now heavy and clumsy, they experience many difficulties which are not attendant upon the endeavours of the very young. By watching them at work, however, one gathers a more correct view of the laying of the foundation of the house than is possible with the minute architect. The newly-hatched larva walks upon its six true or thoracic legs and carries the rest of its body elevated, practically at right angles, to the surface it is walking upon. Being unfed the abdomen is of course attenuated and light, and the attitude is as natural and as easy as to a dog cocking its tail. But as, after feeding for a few weeks, the abdomen becomes inflated and heavy, a more mature insect is at a very great disadvantage, having to contend against the weight and drag of the bulky body which it cannot elevate out of the way. Nor is it able to make any use of the prolegs and claspers which seem functioned only for attaching the body to the inner lining of the bag when made.

The first aim of an evicted caterpillar is to make a circular collar to fit around the neck. I have noticed that they first of all spread a few meshes of silk among the leaves on which they rest to give their clumsy bodies some occasional purchase. Such strands are certainly of some help, as one cannot fail to observe, but without doubt the creature could do much better for itself than it does. It commences by making a collar or, to be more correct, a wreath of leaf-particles and silk. This hoop is gradually built up to one side of the artificer, and when complete the head is put through it and the making of the bag proceeds apace.

The making of such a bag by an evicted caterpillar may occupy a matter of eight hours. The young larva, on the other hand, works actively at its task and is completely encased in an hour after beginning operations. The first operation of the infant architect is to chew off small fragments of the juvenile foliage and interweave them with many threads of silk so as to form a small pile or heap. This pile is made to one side of the head of the caterpillar, and later when it is broadened the insect straddles it. It seems then to work it up with feet and mouth, joining up with a silk thread here, perchance biting off another there. Then it makes a dive through it so that it turns a somersault, and for a moment lies upon its back. It may be said "to see Edinburgh" by looking through its legs and then to overbalance. This acrobatic feat performed, the little creature removes the pellet from its fastenings and is seen with a collar tightly encircled about its neck, presenting a comic enough appearance with its Elizabethian ruff of silk and leaf fragments. The further making of the bag is a simple matter to the insect. Deftly further leaf fragments are woven into the upper edge of the ruff, and as it grows in depth the body is drawn further and further through it until complete. Its domicile constructed, the little creature sets out upon its depredations. Later, as its body increases in size, the bag naturally gets too small for its accommodation, but its enlargement is a simple matter, as the insect has but to enlarge and extend its anterior opening. With

each moult ([37]) the bag is considerably augmented. Not only is its length increased and its capacity in proportion to its owner's increasing stature and obesity, but it is made much more roomy so that the insect may readily turn about within it and strengthen it with inner linings of silk. As growth proceeds larger and larger parts of leaves, leaf stalks, and seed pods are woven into the exterior. In order to affix many of these the major portion of the body has to be withdrawn from the bag. Such work seems to be accomplished at night, but upon this point data is required. As to whether the caterpillar ever actually comes right outside of its bag to so thatch its house ([38]) I cannot say.

The feeding period of the Bagworm extends over at least four months, and then preparations are made for the extended rest and the transformation of the winter and spring months, which have been described.

## ADDENDUM.

### UNSCIENTIFIC NOTES ON BAGWORMS.*

By ALICE PEGLER, Kentani, Cape Province.

One bleak morning in early September I had the good fortune to see the little Bagworms leave the maternal home, where they had been so carefully protected from cold and damp. Yet the little creatures seemed happy enough and soon adjusted themselves to their new environment. One by one each came out of the bag by the lower opening and swinging, spider-like, on a delicate thread waited the moment when the breeze should bear it to a favourable spot. Here it clung and immediately set to work making a covering out of the tender leaflets which the *Acacia horrida* puts forth at this time.

In about half an hour, so far as I could judge, it had encased itself, thus forming the rudiments of the somewhat elaborate "bag" residence. It is years since that September morning, but I have never again seen them actually leave the bag, although this season I visited the trees where they hang in hundreds and observed them every consecutive day for weeks.

Sometimes this pest attacks *Acacia melanoxylon*. Now and again an occasional one may be found on *Loranthus dregei* or on an undershrub, but *Acacia horrida* may fairly be considered its true host, at least in this district.

([37]) Evidence regarding the number and occurrence of moults has not been collected, owing to the want of opportunity for continued observations. The young caterpillar has not been seen to moult before making its bag; there is some evidence that it does so soon afterwards, probably after feeding a few days. Further, before spinning the inner cocoon, the insects appear to moult, and with this final moult lose the deep black colour of the epidermis.

([38]) It would seem as if the Thorn Basket Worm must perforce leave its bag to complete the structure which it inhabits, and when in confinement without food I have on one occasion noted a caterpillar of this species leave its bag.

* Published in *Grocott's Penny Mail*, Grahamstown, 1st December, 1909.

In the early stages the little Bagworms are very difficult to detect. They make raids on the young leaves, then huddle together on the underside of a branchlet, but all at once one is struck by the drooped appearance of the tree, and an occasional spasmodic movement among the leaves attracts attention, and on examination the branch is found to be alive with Bagworms.

From this time onwards they are only too much in evidence, and trees are often entirely stripped of foliage by the voracious caterpillars. When this happens they may be seen making their way across the grass to the next suitable tree. As the bag is something of an encumbrance the journey is rather comical to the beholder.

For about six months they feed and build. Then in January and February they make the inner silk cover, which is rather close-fitting, and about the beginning of March they come to a standstill and very cleverly secure the bag to a twig by means of threads drawn from one side to the other over and over the twig. This fastening is wonderfully strong and impervious to weather.

Here the insect awaits its metamorphosis, and just before entering the pupa stage it reverses its position in the bag and turns its head towards the lower end. The male turns into the chrysalis long before its mate; indeed, I began to think the latter must undergo some semi-change not so easily perceived by the superficial observer, as it was not until the end of June that I found the first female chrysalis, while numbers of males were found in April. Hundreds of bags were examined during this interval, and whenever the bag was cut the female was found on the alert and in haste to repair the damage, which she did very successfully.

The first male hatched out on the 21st July, and at about the same time the female opened the lower end of the bag and, stretching out its head, seemed searching for something. Some worked themselves quite out of the bag, leaving the chrysalis slough half full of eggs, and, falling, lay without legs and without wings, inert and shrivelled, dying after a few days. This behaviour may have been abnormal, as I had been obliged to cut open the bag of each of those I kept under observation to make sure it contained the right insect, and this disturbance may have caused anxiety.

In all the bags taken under natural conditions the female was still in the chrysalis slough, looking like a dried-up mummy, the young apparently having worked their way out of the chrysalis slough where the eggs and wool packing had been deposited over the dead body of the mother. The first eggs were hatched on the 6th of September.

The Bagworms have many enemies (hence the necessity for opening all specimens kept for observation), and it is surprising how few, fortunately, survive and succeed in hatching the young. On one occasion we opened seventy-two bags, finding only three caterpillars; on another we opened one hundred without finding any. These are but two instances out of many. Some are destroyed by parasites, many are eaten by birds, and, strange, the birds seem to know which bag will give the best result—at least during the chrysalis stage. I found dozens of female bags which had been torn open, but not one male at this time.* Spreeuws are the chief robbers; they tear

* It is my opinion that these bags, for the most part at any rate, were torn by rats.—C. Fuller

open the tough bag and extract the caterpillar. These bags then form a shelter for all kinds of things—spiders, grasshoppers, etc. The life of the winged male seems to be but short—those in captivity lived about two days. Judging by the chrysalis sloughs left half out of the bags hundreds must have come to maturity here within the radius of a mile, but they are seldom seen, probably because their colour resembles so closely the bag on which they alight, making detection difficult.

# Cotton Cultivation in the United States of America.

## A STUDY OF THE GENERAL METHOD OF CULTIVATION, AS PRACTISED BY THE MORE PROGRESSIVE FARMER IN THE "COTTON BELT."

By PIETER KOCH, B.S.A.

[NOTE.—The following article was sent to the Tobacco and Cotton Division by one of the young South Africans who went abroad four years ago to take a university course in Agriculture with special reference to cotton and tobacco culture. By reviewing this article one will see that Mr. Koch has gone pretty thoroughly into cultural methods as are practised in the "Cotton Belt" of the United States, and by comparing the conditions in the States, as explained in the attached article, with those of our own here in South Africa, one is led to believe that in some respects our conditions are quite as favourable for cotton production as those of America. In large areas of our middle and low veld we have sufficient rain to produce cotton (cotton will do with less rain than will mealies), and the rains come during the growing period, while the autumn months, at cotton picking time, have a light precipitation. This is a decided advantage in our favour, as it frequently rains continuously for six or eight days during the picking season in the "cotton belt" of the States. One of the chief reasons why the American farmer makes a success of cotton culture and where we fail, he is willing to put more systematic labour into the cultivation of his crop than we are willing to devote to ours. We are pleased to state, however, that the cotton industry in this country is gradually gaining ground. The recent shipping concession for cotton, granted by Sir Owen Phillips on behalf on the Union-Castle Steam Shipping Company, should aid materially in giving the cotton industry a fresh impetus.—W. H. SCHERFFIUS, Chief of Tobacco and Cotton Division.]

### BEST CONDITIONS FOR THE PLANT TO THRIVE.

Cotton is grown under a very wide range of climatic conditions and in a great variety of soils. The plant requires for its best development a peculiar climate and soil, and ideal conditions for its growth are a rich, deep, mellow soil, a warm atmosphere with abundant moisture during the first two or two and a half months after planting, with a drier atmosphere and soil during boll formation until the fibre is mature and gathered.

Although the cotton plant does not flourish during drought, still, broadly speaking, it is a dry-weather plant (on account of its deep rooting system) and heavy rainfall interferes with both culture and stand. However, an extremely dry spring seriously affects its growth. For ploughing it is best to have just enough rain to make the soil moist and spongy. All excessive rain produces weedy plants and causes them to grow too woody, whereas severe drought stunts the plants, matures them too early and a small light-stapled crop results. Early frost causes the plants to turn brown, and cold nights cause many of the plants to die. Lands in hilly uplands require more moisture than those lying in the bottom lands and plains, and when the low-lying lands are too wet they are usually drained.

Ideal conditions are more nearly approximated in the "cotton belt" of the United States of America than in any other large area. The United States being by far the most important cotton-producing country, possessing intelligent cotton-raising people and ideal climatic and soil conditions, one naturally turns to it for the best methods of cultivation. It is believed that the system practised in the States is the most nearly perfect. The methods adopted for the cultivation of the Sea Island (long silky staple) and the Upland Cotton (short staple) differ somewhat in detail, but in general features they are alike. Where indigenous the plant is not an annual, but it is treated as such in cultivation in the "cotton belt."

### PREPARATION OF THE SOIL.

No definite rule can be laid down for this important part of the work. The latitude, altitude, climate and the character of the soil and sub-soil must exercise a controlling influence in determining how and when this necessary preliminary preparation of the soil should be done. Most of the cotton lands receive only one ploughing before the seed is planted, consisting usually in forming ridges or beds. The best farmers plough twice for cotton, first fallowing the land, and then throwing it into beds a few weeks before planting the seed.

On stiff soils, covered with vegetation, ploughing is sometimes done in the fall in order to expose the soil to the action of the winter frosts and to afford the necessary time for the decay of the vegetation turned under; or the land is ploughed level, the beds being formed later by subsequent ploughing.

### TIME FOR PLOUGHING.

The time for ploughing depends on the locality and the soil. For the central area of the "cotton belt" the usual months are February and March (Northern Hemisphere). As precipitation is abundant during the winter and spring months, the time of ploughing is largely a matter of convenience. The general rule seems to be to plough early where the soil is clayey and to freshen up the surface later.

Ploughing only a few days before planting often causes some of the seed to fail to come up in the loose soil which soon dries. Generally the

soil is ploughed at least two months before planting. Cotton requires a firm, well-settled seed-bed, and unless the ploughing is done fairly early, this condition cannot be secured.

## DEPTH OF PLOUGHING.

The depth to which the soil is ploughed depends somewhat on the previous treatment of the field. In places where shallow ploughing has been practised, it is not advisable to make any radical change in the first year, and in working down to a deeper depth a small increase is made each year. Extreme shallowness as well as extreme depth is avoided. A material change in the depth to which the soil is turned would bring a large supply of inert material to the surface, and the supply of available plant food in the upper layer of the soil would be limited. In addition to this there is great danger that the texture of the soil might be injured beyond redemption for several years to come, especially when the soil is wet or clayey. There is also the excessive cost of deep ploughing. At present a depth of eight or nine inches is considered very good preparation. A very large number of the cotton farmers have not yet learned to plough deep. Ploughing three or four inches deep, with a small yield as a result, will continue as long as the farmers and negroes use the small one-horse plough.

Whether sub-soiling will materially increase the yield of cotton, and whether it pays for the extra expense and risks, is still an open question.

## PREPARING THE SEED-BED.

After the land has been ploughed the field is made up of beds and middles or furrows. The seed is planted on the beds, while the furrows facilitate drainage. When the topography of the land is very uneven the beds follow the lines of contour in order to prevent erosion. The beds are as a rule four feet wide and from three to five inches above, while the furrows or middles are the same number of inches below the general level of the land.

Where cotton follows cotton and the soil is sandy, there is usually no preliminary ploughing until the beds are to be formed, in which case the beds are made on the furrows of the preceding year. The beds are prepared by throwing together at least four furrow slices turned up by a one-horse plough, forming a ridge or bed which is about three or four feet wide and a few inches high. Where commercial fertilizers are used, a furrow is made by the small plough and in this the fertilizer is placed over which the bed is afterwards formed. This furrow is made along the line of old cotton stalks or in the middle or water-furrow of the year before.

When the soil is sandy it is desirable to have the bed finished a few weeks before planting in order to allow the soil to become compact, but when the soil is clayey, too long a time between bedding and planting should not elapse else the soil would become too compact.

Some farmers in Oklahoma and Western Texas make a practice of "listing"* their cotton ground. Cotton planted thus is at a disadvantage during the wet season on account of too much moisture, but otherwise it seems to be fairly successful in those dry regions. Listed cotton requires very careful early cultivation to prevent the plants from being covered.

* The meaning differs in several localities. In the above connection it means planting in furrows below the general level of the field.

### Application of Fertilizer.

The fertilizer is usually drilled in the first furrow before the bed has been formed, after which the bed may be immediately thrown up. It is not advisable, however, to supply all the nitrate fertilizer at this time; half of it may profitably be applied during cultivation when the plants are about a foot high. If all the nitrate fertilizer be applied at once, there is danger from leaching especially in case a heavy rain happens to fall shortly after. Proper crop rotation and winter leguminous cover crops will greatly lessen the amount of this fertilizer to be applied. Commercial fertilizers are used almost exclusively, very little stable or kraal manure being obtainable.

When two or three hundred pounds of fertilizer is used, seed may be planted without mixing the fertilizer with the soil. When a greater amount than this is used it is applied in the bed or mixed with the soil. A heavy application may be placed in the centre furrow, but it should be thoroughly incorporated with the soil or it may be broadcasted and the remaining half used in the centre furrow.

### Time of Planting.

About three months are included in the planting limits for the "cotton belt." The time of planting is influenced by the soil, climate, altitude, and latitude. When the ground becomes sufficiently warm to favour germination and is properly prepared, planting may be commenced. This time, is about three weeks after the last killing frost in a particular section. Early planting increases the risk of injury by frost in spring, and late planting reduces the labour of cultivation and also reduces the yield, many of the immature bolls being destroyed by frost in the fall. Early planting, however, decreases the risk of the boll weevil where it is present.

### Quantity of Seed.

The average number of seeds contained in one bushel of cotton seed is usually about 140,000. It is customary to plant one to one and a half bushel of seed per acre. The number of seeds planted per acre may vary from 100,000 to 300,000, while the number of plants finally left to bear fruit does not as a rule exceed 10,000. This might appear wasteful, but good seed is cheap (3s. or less a bushel) and the farmers believe in a good stand. The number of plants to the acre depends upon the fertility of the soil and the habit of growth of the variety cultivated. If planted in rows four feet apart and one foot in the drill, a perfect stand will give 10,890 plants to the acre, i.e. one plant to every four square feet.

### Distance between the Rows and the Plants.

When the soil is rich less seed and a fewer number of plants are required than when the soil is thin and infertile. This is because fertile soils produce spreading and heavy cotton stalks, which, of course, call for fewer plants to the acre and a greater distance between the rows. With mealies just the reverse is true, rich soil requires much seed, poor soil less. The usually accepted distance between the rows is four feet for good fertile soils. On very rich soils the distance may be increased to five feet. On lighter soils of ordinary fertility a distance of three feet suffices.

The distance of the plants in the row is about twenty inches. For poor soils sixteen inches in the drill is the distance ordinarily accepted. For rich soils two feet is the proper distance. "To increase this distance

(18 inches) beyond two feet is usually unwise, except when the soil is very rich; in this latter case, it is better to increase the width of the rows than to space the plants much more than two feet" (F. E. Duggar). From the same author the following may be added in connection with the distance between the rows:—"The wider the rows can be made without reducing the yield, the cheaper is the cost of cultivation, since work with cultivators is cheaper than work along rows with the hoe."

### COTTON PLANTERS.

Most of the cotton planters plant a single row at a time. A planter opens the furrow, drops the seed and covers it all at the same time. At present the most economical planters drop the seed continuously. For accurate experimental work the seeds are dropped by hand, or a planter for the purpose, at regular intervals.

Cotton seed is covered about an inch and a half or two inches. When the seed is planted deeper than two inches and there comes a rain before germination, the seed often rots in the ground. This is nearly always the case when it is planted as much as three inches deep. Planters can be regulated to plant at the depth desired.

### BROADCAST TILLAGE.

If the rain falls before the seeds germinate or appear above the ground, or after the seeds vegetate, showing the green colouring matter, until thinning takes place broadcast tilling should be practised. It is also often practised a few weeks or a few days before planting. When the stand is thin, or the land stony, or full of trash, it is sometimes impossible to use the weeder (light harrow) to any advantage. Broadcast tillage not only prevents loss of moisture and destroys germinating weeds, but it also aids the young plants to lift their cotyledons (seed leaves) above the surface. When running the weeder cross-wise over the field shortly before thinning, it will permit the latter operation to be put off and to be done more cheaply. At present very little of this branch of tillage is practised in the "cotton belt."

### THE PURPOSE OF TILLAGE.

There are no definitely fixed universal rules for cultivation. The destruction of weeds and grass is not the only purpose of cultivation, but also to keep the surface constantly mulched with loose soil. This latter prevents loss of moisture by evaporation from the whole surface, retaining the moisture below the mulch, for the purpose of dissolving and conveying plant nutrients into the plant. A crust upon the surface hastens the escape of moisture through capillary tubes and thus brings the soluble plant nutrients to the surface out of reach of the roots of the plant. It is, therefore, very necessary to break up the crust as soon as it forms. A mulch further acts as a sponge in absorbing the rain-water and preventing surface run-off.

### FIRST CULTIVATION.

Seldom is any cultivation done until the plants are about four inches high, which is about three weeks after planting. The purpose of this cultivation, which is done with the small one-horse turn plough, or a narrow sweep, is principally to reduce the width of the strip that is later to be thinned by the hoe. This cultivation, as also all subsequent cultivations, destroys grass and weeds, and forms a mulch.

### "BARRING OFF" OR NARROWING THE STRIP TO BE HOED.

This consists of throwing a small furrow away from the row with a narrow sweep or scrape, often supplied with a fender to prevent the rolling of too much soil on the small plants. This leaves the plants on a low, narrow strip of soil or ridge.

### THINNING.

As soon as possible after the operation of "barring off" or "scraping," as it is otherwise called, the cotton is chopped out to a proper stand. This work can be carried out best by the use of the hand hoe. Cotton chopping machines have recently been placed on the market; though by no means perfect as yet, new devices are being added from time to time, and when the respective types have been perfected the cotton grower will very probably be able to thin a much larger area than by the old method. Generally one or two plants are left to the hill at about eighteen inches apart. If the plants are very small and the conditions are unfavourable, it is desirable to leave at least two plants to the hill. There are a few good farmers, according to Burket and Poe, who are depending less on the hoe and more on the weeder and harrow for chopping. Either of these tools when run crosswise over the rows does quite effective work in thinning the crop.

Early thinning ensures a stronger growth in the plants which are allowed to remain. The extra cotton plants can be considered as weeds for they take up moisture and plant food which should be kept in store for the plants which remain to produce the crop. If weeds appear in the drill and it is impossible to reach them with the cultivator, they should not be allowed to go to seed, but should be cut with the hoe or pulled up by hand.

### SECOND CULTIVATION.

The purpose of the second cultivation, the first after thinning, is to throw some dirt about the plants, to kill weeds and to form a mulch. This operation is done soon after thinning, especially on soils likely to suffer from drought. A wider sweep or scrape than that used for "barring off" is used. The implement is run close on both sides of each row.

### THIRD CULTIVATION.

The object in this cultivation is to break up the "middle" left from the previous cultivation. A large sweep is run over the middle and breaks it up, throwing dirt on one side of each of the two enclosing rows of plants.

### FURTHER CULTIVATION.

The following cultivations follow each other rapidly. As a rule, a single heel scrape, ranging from eighteen to twenty or thirty inches wide, is used, or the same attached to an ordinary cultivator together with four or five small shovels. This operation is done as often as deemed necessary. At all events it should be done under the following conditions:—When the weather is dry, when weeds get a foothold, or soon after a rain. The rows are cultivated at least four times; but six or seven cultivations are not too many and are in fact often very desirable. As soon as cultivation begins to injure the limbs of the plants, it is time to stop. Should a rain occur after this, it is usually necessary to give another late cultivation to prevent the formation of a crust. After the second cultivation one of the best implements for the purpose probably is a light cultivator with several

shovels. Many farmers use even more kinds of implements in cultivating cotton, but this is unnecessary. The farmer who goes in for cotton raising on a small scale can safely apply more or less the same methods of planting and cultivation as are followed in growing mealies intelligently.

### HOEING.

When weeds become too rank between the plants in the drill hoeing is resorted to. This operation requires much labour and is rather slow.

### DEPTH OF CULTIVATION.

The first cultivation may be shallow or deep, according to the judgment of the farmer. It does not make much difference as the plants have not yet developed roots long enough to be injured by cultivation. After that the cultivations are shallow, usually one and a half or two inches deep.

### SUMMARY OF THE TIME REQUIRED FOR THE DEVELOPMENT OF THE COTTON PLANT FROM GERMINATION OF SEED TO THE RIPENING OF THE BOLL.

When conditions are favourable, germination usually takes place in seven to fourteen days. When the plant is about five or six weeks old the flower buds or squares appear. About three weeks then pass before the buds begin to open. From the opening of the bloom to the opening of the boll takes forty to fifty days, differing with the climate and the variety. It will then require a few days until the fibre is fully mature, after which time the cotton is ready to be picked.

### CONCLUDING REMARKS.

Whether it is worth while to prepare the land properly and to cultivate frequently can readily be seen by comparing the results obtained in two adjoining cotton fields in Texas. The soil in these two fields is identical, the treatment for the previous twelve or thirteen years was more or less the same, and acclimatized cotton was planted in each case. In one case the grower ploughed only a few inches deep, fertilized his land improperly and paid little attention to cultivation. Just across the fence a tobacco experiment station had been established the year before, and on one of the plots, which had been planted to tobacco the preceding year, cotton was planted. The land was ploughed ten inches and sub-soiled three inches deeper; it was judiciously fertilized, and a deep, thorough cultivation was made soon after thinning, followed by frequent cultivations, until the growth became so dense that cultivation had to be discontinued. In the former case the yield was one-eighth of a bale to the acre, in the latter case it was two bales—sixteen times as much. Does it pay to apply improved cultural methods?

In adopting some phases of the cultural methods as practised in different countries, allowance must be made for the conditions which prevail. For instance, the amount of rainfall in the "cotton belt" of the United States is of a non-torrential character and rather heavy, especially during fall, winter, and early spring, thus making winter and early spring ploughing possible. The precipitation in the larger portion of South Africa is torrential in character and the loss through run-off very serious. It is, therefore, of the utmost importance for the farmer to study the best methods of handling his field so as to absorb as much of the rainfall as possible. Deep ploughing and mulching will accomplish much to this end. Shallow ploughing, on the contrary, especially

on hilly or sloping land, may lead to washing. Again, many of the implements used by the cotton farmers in America are small and can be improved upon considerably. But whatever the conditions may be, the fact remains that the average farmer in South Africa pays as yet too little attention to improved cultural methods, and until it is done the farmer will fail to reap the full benefit of his labours.

REFERENCES.

Cotton Bulletins of the Experiment Stations of South Carolina, Alabama, and Oklahoma; Duggar's "Southern Field Crops"; Bulletin No. 144 of the Texas Experiment Station.

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# Peach Tree Aphides.

## REPORT ON PEACH APHIS INVESTIGATIONS DURING LATE WINTER AND EARLY SPRING, 1912.

C. B. HARDENBERG, Division of Entomology.

DURING the winter and early spring of last year (1912) I made some observations and experiments regarding the life history and control of the black and green peach aphides in the Pretoria and Johannesburg districts, where these two insects are generally very prevalent and may cause a complete failure of the peach crop in some localities, if not promptly attended to.

The increasing abundance of these two pests has caused of late a great deal of alarm amongst the owners of private and commercial orchards, and the experiments were undertaken with a view to demonstrate the practicability of the measures repeatedly advocated by this Division. Although the efficacy of the dilute tobacco wash had been repeatedly demonstrated from small trial experiments, the fact that the remedy must be applied repeatedly made it doubtful whether this procedure could be followed with advantage commercially. The result of these experiments has been such as to demonstrate fully the advantage and practicability of the treatment, as it was found that the cost of the several applications which may be necessary is very small in comparison with the benefit and profit derived therefrom.

### SEASON HISTORY.

Of these two kinds of aphides the black peach aphis is the first to appear on the peach trees. It becomes noticeable when the first buds begin to burst open, and increases in abundance during the entire blossoming period, after which there appears to be a slow decrease, and, after the beginning of the spring rains it practically disappears. The injury which is done is mostly confined to the fruit buds.

The green peach aphis, on the other hand, confines its attention to the young leaves, soon after they have begun to unfold themselves. The lice station themselves on the underside of the leaf, and the many punctures and cicatrices arising therefrom prevent the full development of the underside, as a result of which the upper side grows faster and this unequal growth cause the leaf to curl. The sucking of the sap prevents a normal development of the foliage, which becomes yellow and stunted, and the tree, if heavily infested, may be prevented from throwing out a sufficient crop of leaves. This, interfering as it does with the respiration, handicaps the tree severely, and as a result the tree is stunted for the rest of the season and may even die as a consequence. Such fruit as is set does not develop, but after reaching about the size of a hazelnut becomes hard, dry, and drops off. When the first crop of leaves has thus been killed the tree tries to put forth a second, but where the aphis has been allowed to go unchecked, the new leaves are attacked as soon as they appear, and the result is a sickly yellowish appearance of the tree with scanty, curled foliage. By the time this condition is reached, the aphides are decreasing, and may even have practically disappeared, and several cases have come to my knowledge where this appearance was attributed to a disease. The most serious injury resulting from green peach aphis I noticed at Dewetsdorp, Orange Free State, on 25th October, 1912, while visiting the village for a demonstration spraying against codling-moth. The trees had hardly any foliage at all, and such as there was had been stunted and twisted out of shape, forming little yellowish bunches on the twigs. It seemed to me that these trees were doomed, but I was not able to get any information about them later in the season. There certainly was no crop of fruit. It seems hardly possible that such trees could recover after the rains.

My observations on the two peach aphides can be divided into such as relate to

1. Life history—(hibernation and dispersal).
2. Parasitism.
3. The use of tobacco-extract as a means of control.

## LIFE HISTORY OF BLACK PEACH APHIS.

In the laboratory garden at Visagie Street I first noticed the black peach aphis on 23rd June. A colony was found on a lower shoot, near the ground, and a careful inspection of the tree showed no signs of infestation anywhere else. The colony was attended by ants, of the species commonly called the sugar ant.

The tree had been fumigated for scale during the previous season and banded with cotton wool near the base to prevent the ants from carrying up young scales, but the band had long since become ineffective, and the aphis colony was found above this band. The colony remained practically stationary for a long time, due to the cold weather, and only toward the end of July was I able to find any further spread of the infestation. On 30th July I found one little tip infested. This was on a branch, far removed from the original colony, and was the only tip where the flower buds were swelling, one being half opened. On another tree a colony was found where the outer bark had become loose, exposing the inner bark, on which the aphides were feeding.

On another tree in Visagie Street, located in a sheltered situation, I found that the leaves had remained on during the winter. There not only the stem and flower buds but also the leaves were thickly covered with a strong colony of black aphis, very heavily parasitized by a minute wasp.

Watching the spread of the aphides during the succeeding days I found them appearing wherever the flower bud showed the first signs of swelling. Whether the aphides are there because these buds are the earliest ones to open, or the sucking by the insects causes an increased sap flow locally, or by some irritation causes the buds to swell and open earlier is an undecided question.

Among the spring colonies the first winged individuals were noticed on the 31st July. In the colony which had presumably hibernated on the tree in the sheltered situation just mentioned, winged forms were also found, but they may have been produced much earlier—and it seems therefore that winged aphides begin to appear when a certain favourable mean temperature is reached.

The distribution of these aphides is very peculiar. Wherever the buds shows signs of swelling, we are sure to find a few aphides among them. This distribution seems to bear no relation whatever to the first colony, which is generally found at the base of the tree. These swelling buds are sporadically distributed over the tree, without any semblance of regularity. If the buds were normally swelling, we might expect that they would open sooner on the north side of the tree, which is more favoured in regard to sunlight, but no such relation seems to exist, as the swelling buds may be found anywhere. They are also not necessarily situated at any place on the twig.

It seems therefore hardly probable that the ants should be responsible for the distribution of the aphides, as has been supposed. If this were the case we might expect a gradual dispersal from the neighbourhood of the bottom colony, and also a more or less general distribution along the twigs. The scattered position of swelling buds on the trees, without any relation to the more advantageous position as to sunlight, makes it probable that the aphides are not selecting the swelling buds, but that the buds begin to swell earlier on account of the presence of aphides in their vicinity.

The fact that the first observance of winged individuals coincided with the first signs of dispersal favours the theory that the winged forms are responsible for this dispersal. I have generally found the young colonies at the base of the buds to consist of one or two old ones surrounded by a number of young ones. It seems that the winged forms, produced in the hibernating colonies (and the early spring colonies at the base of the trees may well have arisen from hibernating individuals) fly to other trees or other parts of the same tree and there produce either a young by parthenogenesis, or deposit an egg, which is the progenitor of a new colony.

On the 1st August I found what I *thought might be* the eggs of this species. They appeared as very small, round objects of a dark blood red colour and shining, practically invisible to the naked eye, deposited singly or in pairs in the axil of the bud. These "eggs" looked perfectly fresh, and while the branch was covered with brown dust, these bodies themselves were perfectly clean and bright. I put a small branch (with three of these "eggs") about 2 inches long in a closely corked glass tube and found the next morning two young aphides on the branch, while only one "egg" could be found remaining. It is hardly possible that I could have overlooked the presence of two small aphides on this little piece of twig before closing the tube, and my opinion is that the two aphides found the next morning came from two of these red bodies.

I give this observetion for what it is worth, without drawing any definite conclusion, for I was not able to repeat the observation. Owing to the minuteness of the objects and the comparative scarcity (probably

only two or even one on a twig) and their concealed position, the detection of them must always be a matter of chance. It is also possible that the minute objects were really very small aphides which showed no movement and had their beaks inserted in the twig. For obvious reasons I did not want to disturb them, but I do not think they were young ones, as even under the magnifying glass I could not detect any head, thorax, or cornicles.

It was very improbable that they could have been the eggs of the Bryobia Mite (which they much resembled in size) because they were of a deeper red colour and looked perfectly fresh. The tree otherwise showed no infestation with Bryobia Mite. The presence of eggs would explain the distribution from the parent colony in a satisfactory manner, and I think it would be worth while to try and have this observation confirmed this season.

As the season advances the aphides become very much subject to parasites and predaceous enemies. Of the true (internal) parasites, I have been able to rear only one small hymenopterous insect. This was especially abundant in the old hibernating colony, and in the absence of definite data as to the life of the parasite when the aphides have practically disappeared, I may venture the opinion that these hibernating colonies keep the parasite in existence during the remainder of the year.

The parasitized individuals can be recognized at once by their abnormal colour. Those which have died are a dirty yellowish-brown and almost globular in shape. The younger ones, still living, show their infestation by their olive green colour, the body is somewhat swollen and very shining, and the parasitic grub can be seen inside as a dark object lying curled up in the abdomen of the aphis. In old colonies this parasitism becomes excessively abundant, as I have counted in some cases 90 to 95 per cent. of the full grown individuals parasitized.

## PREDACEOUS ENEMIES.

Besides several species of ladybirds, there are two kinds of Syrphus flies instrumental in keeping the aphis within bounds. One is *Xanthogramma scutellaris* (determined at Pretoria Museum), the other a species I was not able to get determined, the former being by far the more abundant. On the 28th August I observed *Xanthogramma scutellaris* in the act of egg-laying. The female hovered in front of a colony of aphides for a short while, then darted forward and attached itself to the branch, remaining with the wings spread. The abdomen was curved down and the egg deposited on the branch. The aphides did not appear to be at all disturbed during this process. The egg laid, she took time carefully to clean the abdomen with the hind legs, scraping the upper and under side and then rubbing tarsi and tibiae of the legs together. This is probably for the purpose of removing any honeydew with which she might have soiled herself. She then moved a short distance along the branch, felt around with the tip of the abdomen for another suitable place and deposited another egg. I saw two eggs laid with an interval of a minute between, and Mr. Thomsen of this Division informed me that he had seen five eggs deposited in as many minutes. The eggs are attached by the broader basal end, the narrower end through which the larva ermerges is thus in the body of the parent directed towards the head. There is a slight difference in flight between the male and female syrphus fly. While the male will "stand" for a considerable time and at a certain distance from the branch, the female flies more like a bee, with very short pauses and generally in the immediate neighbourhood of the branch.

Copulation was repeatedly observed to take place about 5 p.m., the male above the female and the latter sitting on the tip of a branch. The great majority of the specimens caught were males. Out of a dozen specimens captured one afternoon, eleven were males; of those bred in captivity the majority were males also.

Eggs laid on 29th August, 11.30 a.m., had not hatched at noon, 1st September (Sunday), but were found hatched on Monday morning 9 a.m., the incubation period appearing to be between three and four days. The egg is somewhat ovoid in shape, ·95 mm. long by ·35 mm. wide at its base, narrowed toward the free end, and the narrow end truncated. It is of a pearly white colour, and to the naked eye appears smooth, but magnification shows a delicate sculpture of longitudinal ridges, which are interrupted by numerous transverse incisions, forming thus lenticular areas, placed lengthwise. The broader end is fastened (slightly at the side) to the twig, bud, or petal as the case may be, while the anterior narrowed end is elevated, the long axis of the egg making an angle of 30° to 45° (or even 60°) with the substratum. At first the egg is of a uniform pearly white colour, but as time of hatching approaches it becomes grey, which shade becomes most pronounced toward the anterior end. In the centre of the truncated end there appears a minute small spot, when the eggshell is being pierced by the larva within.

The newly hatched larva is about 1 mm. long, but grows within two days to a size of 2½ mm., while at the end of a week a length of 5 mm. is reached. When food supply is abundant the further growth is rapid and in about five days more the larva has reached its full size of 10 mm., when pupation takes place. In the cases observed the pupa stage lasted four to five days only.

It seems that the syrphus fly larva attacks by preference the half-grown aphides. It feels around with its anterior end until it touches the body of an aphis, it keeps closely applied to it, while the buccal hooks are moving back and forth, piercing the skin. It seems that the skin of the full-grown aphides is too hard to be easily penetrated and I have repeatedly seen the larva give up the attempt and transfer its attention to a younger aphis. The piercing of the skin takes about half a minute. Strangely enough, the aphis does not move away during this process. Once the skin is pierced, the victim is sucked dry either *in situ* or lifted off by the larva. I have seen five aphides taken in succession by one of these larvae without a pause.

The other syrphus fly is much less abundant. Its egg, found in similar situations as that of *Xanthogramma scutellaris* is shorter and more coarsely sculptured. The larva is more spiny. Its life history and habits are similar to the previous one.

I have not succeeded in finding any lace-wing fly.

## GREEN PEACH APHIS.

There is no doubt that the green aphis hibernates on cruciferous plants and probably some weeds belonging to other plant families. Mr. W. Moore, of the Potchefstroom School of Agriculture, has reported it on cabbage during the winter months, while I have found it on parsnips which were growing between peach trees in a garden in Johannesburg. (This garden was badly infested with green peach aphis the following spring). The same syrphus flies as attack the black peach aphis attack the green also, and I have noticed in addition a third species of syrphus fly, larger than the two just mentioned and nearly black, hovering over the colonies, but was not successful in my attempts to capture it.

The life history of this species was not worked out, as at that time my attention was mainly devoted to the control measures.

## LABORATORY TESTS OF TOBACCO EXTRACT.

Experiments were first made in the laboratory with a view to determine the amount of dilution which would still be effective in killing the aphides. Both "Eagle Brand" (Leaver's) and "Lion Brand" (McDougal's) tobacco extracts were used.

The nicotine contents of each were determined by the Chief Chemist, Mr. Vipond, as follows :—

| | | |
|---|---|---|
| "Eagle Brand" | ... ... | 7·98 per cent. nicotine. |
| "Lion Brand" | ... ... | 6·56 per cent. nicotine. |

A third brand of tobacco extract, the "Austrian Arrow Brand," was found to have a nicotine content (not nicotine sulphate) of 8·88 per cent., but as this could not be readily procured, I confined myself to the two first-mentioned ones for practical purposes.

Dilutions of different strength were made and a branch containing live aphides in different stages was dipped in the liquid for a few seconds, moving the branch up and down, to ensure thorough wetting of the insects, and then left to dry. The results were as follows :—

### "*Eagle Brand*" *: 7·98 per cent. nicotine.*

1. Dilution : 1 : 200.—Nicotine contents 0·0399 per cent.

9th July, 1912. Branch with matured females and young dipped in this solution for half a minute and allowed to dry in the shade (inside laboratory).

9th September, 1912. Young ones all dead and shrivelled up. The old ones maintained only a very feeble hold, the proboscis was no longer deeply inserted, and the only movement was a slight tremor of the tarsi when disturbed.

9th October, 1912. All dead.

2. Dilution : 1 : 150.—Nicotine contents 0·053 per cent.

9th September, 1912. Branch dipped with aphides for a few seconds left to dry in the shade (inside laboratory). Another branch with aphides was similarly treated and left to dry in the sun.

9th October, 1912. Those let dry in the sun show the young ones nearly all dead ; those in the shade are sickly.

9th November, 1912. Those dried in the sun all dead ; those dried in shade showed only the old ones feebly alive, and these died in course of the day.

3. Dilution : 1 : 100.—Nicotine contents 0·0798 per cent.

9th September, 1912. Lot dipped for a few seconds in the extract and left to dry—one part in the sun, one part in the shade.

9th October, 1912. Those dried in the sun all dead. Of those dried in the shade, the old mature ones still alive, but sickly. These were dead the next day.

4. Dilution : 1 : 80.—Nicotine contents about 0·1 per cent.

9th September, 1912. Lot dipped for a few seconds, and part allowed to dry in the shade and part in the sun.

9th October, 1912. Those dried in the sun all dead. Of those dried in the shade, the majority dead, the others dying.

Result practically the same as with the dilution of 1 : 100.

5. Dilution: 1 : 40.—Nicotine contents about 0·2 per cent.

9th September, 1912. Lot dipped like the previous ones, and one part allowed to dry in the sun, another in the shade.

9th October, 1912. Those dried in the sun all dead, those dried in the shade practically all dead; no movement of the adults except a slight tremor of the antennae; dying off.

*"Lion Brand": 65 per cent. nicotine.*

With the "Lion Brand" tobacco extract the results were very similar; the same experiments were performed with dilutions—

1 : 80 (0·082 per cent. nicotine).
1 : 100 (0·0656 per cent. nicotine).
1 : 150 (0·0437 per cent. nicotine).
1 : 200 (0·0328 per cent. nicotine).

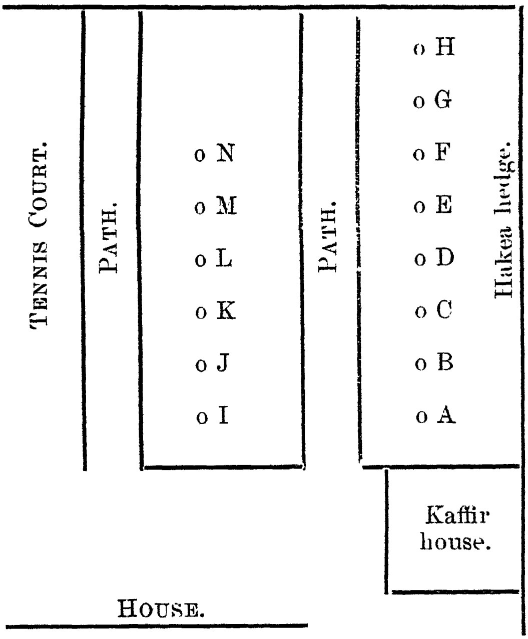
The action of the extract was similar to that of the "Eagle Brand" with dilutions of nearly the same nicotine contents.

We see from these experiments that there is very little acceleration in the action of the tobacco extract after we reach a strength of about 0·080 per cent. This seems to be the strength at which the nicotine takes effect, and from that moment the insects are being injured and begin to die, death taking a certain amount of time. In the more diluted solutions it takes some time before, through evaporation, this strength is reached and thus the action of the extract is slower. The evaporation is, of course, hastened through sunshine, which accounts for the quicker effect, while this evaporation and consequent concentration is probably counteracted to some extent by the secretion of honeydew. But even in a dilution of 1 : 200 the action of the tobacco extract is fatal. It is, of course, possible that still further dilution may be ineffective, in so far that the honey-dew secreted may wash off the minute amount of nicotine before the injurious concentration is reached. But even in the higher concentrations the sun has a great influence in hastening the action, and this no doubt is due to the temperature. Direct experiments with the extracts at different temperatures were not made, but I have no doubt that the tobacco wash if applied hot would have its effectiveness greatly increased.

It follows from these experiments that a dilution of 1 : 100 in the case of "Eagle Brand" and 1 : 80 for the "Lion Brand" are the most effective strengths to use (that is, no advantage would be gained by using a higher concentration), and also that spraying done on a sunny day would be more effective than if applied in cloudy weather.

## FIELD SPRAYING EXPERIMENTS FOR GREEN PEACH APHIS.

Through the kindness of Mr. H. F. Benger, of Johannesburg, arrangements were made for spraying experiments to be conducted in a private orchard in Johannesburg. The premises were those of Mr. B. Moses, Smith Street, Yeoville, and Mr. Benger informed me that the orchard had been badly infested with green fly the previous season; also that the surrounding gardens promised to show a heavy infestation this winter and spring. Below is a diagram of the part of the garden containing the peach trees.




B—Pear tree, not treated.

M and N—Apple trees, not treated.

The garden was well kept and the soil between the trees cultivated. In the immediate neighbourhood of the trees and along the path a few parsnips were left, on which "green fly" was found.

The first spray was given on the 13th September, 1912, the condition of the trees being as follows:—

A.—Fruit set and leaves out. No green aphis present as yet.

B.—Pear tree, not treated.

C.—In full blossom. A few leaves out and green fly just starting to appear. Sprayed with "Eagle Brand" tobacco extract 1 : 80.

D.—Fruit just set. Leaves out. Green peach aphis abundant, as shown by appearance of leaves. Sprayed with "Eagle Brand" tobacco extract 1 : 80.

E.—Fruit set. Leaves out. Green aphis present in small quantities. Sprayed with "Eagle Brand" tobacco extract 1 : 80 plus F. and F. soft soap at the rate of 1 lb. to 25 gallons of water.

F.—Fruit partly set. Leaves just starting. Aphis also just beginning to appear. Sprayed with tobacco extract 1 : 80 plus soft soap as above.

G.—Fruit fully set. Leaves out. Green fly abundant. Sprayed as F.

H.—Half bloom, practically no leaves out. One half of the tree was sprayed as above to see if it would act as a deterrent; the other half left unsprayed.

The next morning the spraying was continued.

I.—Nectarine fruit set and full leaf. Green fly just started to appear. Sprayed as above.

J.—Nectarine fruit set and in full leaf. Green fly just starting. Left unsprayed.

K.—Peach. Fruit set. Leaves just starting. No green fly as yet. Sprayed as above.

L.—Peach. Fruit set. Leaves just starting. No green fly present as yet. Sprayed as above.

One half of D was sprayed again with tobacco extract plus soap.

On 17th September, the second spray was given and conditions noticed as follows :—

A.—Check. Green fly appearing.

C.—Half blossom, half set. No green fly ; the few which were there on the 13th have been killed.

D.—On the half which was sprayed once the green fly is appearing again ; on the other half which was resprayed with the extract plus soap the aphis is dead and up till now no reinfestation has taken place.

E.—Aphis present again, especially on north side of tree. Three kinds of ladybirds and syrphus fly larvae feeding on it.

F.—Half flower, half set. Aphis present, though in small quantities.

G.—Green fly has greatly decreased as compared with condition on the 13th, but is still present.

H.—Neither unsprayed half nor sprayed half show any sign of green fly infestation. Leaves just starting to come out.

I.—Green fly present in small quantities.

J.—Small quantity of green fly (unsprayed).

K.—No green fly.

L.—No green fly.

The trees were sprayed again on 21st September, the condition of the trees being as follows :—

A.—Unsprayed. Aphis present in considerable numbers but heavily parisitized.

C.—Quantity of live aphis negligible. In most cases the curled leaves contained dead aphides. These leaves had been already curled up when the last spray was applied. No apparent damage to blossoms ; these had set normally, even where heavily sprayed.

D.—Difference between the two halves very slight, but a little more green fly on the half which had not received the second spray on 14th September.

E.—A slight infestation. Greater part of aphides dead, but some started again. Fruit well set.

F.—No fly apparent. Fruit set splendidly.

G.—Most of the curled leaves contained dead aphides, but on several instances a few females were found with numerous young. These females had apparently escaped the previous spray.

H.—A slight infestation on the unsprayed half. Sprayed half clean.

I.—Clean.

J.—Aphis increasing (unsprayed).

K.—Clean.

L.—Clean.

All the trees, except A and J, were sprayed again with the same mixture as previously. It appeared thus that the green fly was being kept pretty well under control. Heavy wind and dust storms prevented spraying being continued for about a week, and then another spray was given, the conditions being practically the same as at the last examination.

A final look was given on 8th October and the results are shown as under :—

A.—Check, unsprayed. Very badly infested.

C.—Infestation extremely slight, only one spot noticed.

D.—Infestation though slight, somewhat more pronounced than in C. No difference between the two halves.

E.—Very slightly infested. Apparently recently attacked.
F.—Very slightly infested.
G.—Very slightly infested.
H.—No green fly present.
I.—Traces of infestation.
J.—Unsprayed, becoming badly infested
K.—Very slight infestation.
L.—Practically free.

It appears from these results that the spraying with tobacco and soap proves very effective in the control of the green peach aphis. No doubt the result would have been still more favourable if I had not left two trees (A and J) untreated. These, in course of time, became badly infested and were a continuous source of reinfestation for the neighbouring sprayed trees.

The fourth spray was applied on account of the lateness of the spring rains; in ordinary circumstances three sprays at intervals of four or five days would have been sufficient to keep the pest down.

*Apparatus used.*—The mixture was made in an ordinary barrel spray pump, holding about 35 gallons, and could be easily carried by two boys from tree to tree. The spraying was done by means of a spraying rod (about 6 to 8 feet long) with a two-nozzle spray and an underspray attachment. The latter is absolutely essential in spraying for the green fly. The secret of successful spraying is to spray from underneath the leaves, alongside the branch. The force of the spray blows the curled leaves apart, thus allowing the spray to touch the aphides on the underside. Spraying in the ordinary way, from above or from the side, toward the branch, has no effect, as the spray cannot penetrate into the interior of the bunches of curled up leaves and the force applied in that direction would cause the leaves to bunch closer, thus defeating the object in view.

I have since received word from Mr. Benger that he had seen the tenant of this garden and am informed that "*a splendid crop of fruit was picked off these trees this year.*"

*Cost of the treatment.*—The amount of material used averaged two gallons per tree. One gallon tin of tobacco extract costing 13s. and a half gallon F. and F. liquid soap costing 5s. made 80 gallons of dilute wash, so that the cost per gallon worked out at 2·7d., and the cost per tree per application was 5·4d., or say with the labour (one boy) 6d. per tree. This would mean for four sprayings 2s. per tree, but in ordinary seasons (and if all trees are sprayed, so as not to leave centres for reinfestation) three sprayings would be sufficient. Thus at an expense of 1s. 6d. per tree a splendid crop can be assured, even in heavily infested areas. The cost will probably be proportionately less where the spraying is done on a larger scale. I may add that the trees appeared to be about six years old with a well developed crown, and not too high to interfere with thorough spraying.

It appeared that some varieties were much less subject to attack from green fly than others. This was specially noticeable in H, where one half was sprayed and the other half left unsprayed. There was practically no difference between the two halves. This may have been due to a practical immunity against green fly, but also may have been accounted for by its being the last in the row and farthest removed from the trees A and J, which apparently had been the centres of reinfestation for the other trees.

I was not able to learn the different varieties of the trees in this orchard. At the time the experiments were conducted the tenant, Mr. B. Moses, was away, and Mr. Benger, upon my request, inquired upon his return, but he had no record of the varieties of the trees.

## SUMMARY.

1. In sheltered situations the black peach aphis probably hibernates on the trees and may breed through the winter.

2. Though primarily infesting the young shoots and fruit buds, the black aphis will also attack the leaves.

3. Dispersal does take place most probably through the agency of winged individuals, which are produced as soon as a favourable mean temperature is reached. The distribution is too scattered to admit of its being effected by ants carrying the young aphides to other situations on the tree.

4. The presence of aphis at the base of the flower bud causes it to swell and open prematurely, or at least in advance of others which are not attacked by aphides.

5. The green peach aphis breeds in the winter on cabbage, parsnip, and probably other cruciferous plants.

6. In the absence of definite data regarding the season history of the black peach aphis parasite we may presume that the hibernating colonies keep this parasite breeding through the winter season.

7. The black peach aphis is attacked by one hymenopterous internal parasite and prayed upon by two species of syrphus fly. The green aphis suffers in addition from a third species of syrphus fly, and three species of ladybirds have been found to feed upon it.

8. The total length of the life cycle of the syrphus fly (*Xanthogramma scutellaris*) is about three weeks; egg stage three to four days, larval stage about twelve days, pupa stage five days.

9. The syrphus fly pairs in late afternoon. Eggs are deposited at intervals of about one minute.

10. Tobacco extract at a solution containing about 0·082 per cent. nicotine is the most effective strength. No advantage is gained in using a stronger solution. This kills the aphis within 24 hours. This corresponds to dilution of "Eagle Brand" extract of 1 : 100 or of "Lion Brand" extract 1 : 80.

11. The tobacco wash is more effective in sunshine than in dull cloudy weather.

12. Green peach aphis can be effectively kept under control by three thorough sprayings about five days apart, the first being applied as soon as the first leaves open out. The appearance of the first should be watched for closely.

13. For effective spraying an underspray attachment is essential. The spray should be applied along the branch from below (towards the tip of the branch or twig), as the force of the spray will momentarilly open the curled-up leaves, thus allowing the insects to be touched by the spray.

14. The use of soap at the rate of 1 lb. in 25 gallons of spray is advisable.

15. The cost of the application should not exceed 1s. 6d. per tree for the three sprays together.

16. By means of these three sprays a good crop of peaches can be secured even in heavily infested orchards.

17. Clean cultivation between the trees is advised. Cabbages, parsnips, or cruciferous vegetables should not be grown during the winter in or near the part of the garden where peach trees are standing, as they furnish breeding places for the green peach aphis.

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[NOTE.—The above report on spraying tests concerns the green peach aphis. The black species is commonly found during winter; and when it has to be combated, it is advisable to take advantage of the nakedness of the twigs by making a thorough application of the spraying preparation shortly before the buds open. Should three sprayings as recommended not suffice for the control of the green species, as may be the case in seasons which particularly favour the pest, applications at intervals of about five days should be continued.—CHIEF, DIVISION OF ENTOMOLOGY.]

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# Bee Disease at Johannesburg.

THE following remarks on a bee disease, which for a while was feared amongst bee-keepers to be foul brood, are included in a recent report submitted by the Chief of the Division of Entomology:—

A brood disease of bees in an apiary of six hives at Johannesburg was brought to the notice of the Division in August, 1911. The trouble was not really bad and was clearly discernible in one hive only, but on suspicion that it might be European foul brood the hives, bees and all, were purchased by the Government and destroyed. A nominee of the South African Beekeepers' Association was then engaged for a week to inspect all the hives he could find in and around Johannesburg. This inspector had had practical experience with bees in Europe, and he found what he thought was foul brood in a few hives at three of the places he visited. Before I had heard of the trouble, a piece of suspected comb had been sent to Pretoria and had been referred to the Plant Pathologist who had reported that he was unable to find any organism which would account for the death of the brood. Another piece had been sent from Johannesburg to the Secretary of the British Beekeepers' Association, who had replied:—

The brood you sent has been microscopically examined by Mr. Cowan who says:—"I am afraid it is a case of foul brood although characteristics differ slightly from either of our two forms. That however does not matter much and may have something to do with the climate. Of course to determine which of the bacilli it is, a cultivation should be made, but I think it is pretty safe to say that it is foul brood."

A full section of comb, the one most representative of the trouble in the hives bought and destroyed by the Government in August, was sent by the Division to the United States Bureau of Entomology for the favour of examination by Dr. E. F. Phillips, now probably much the best authority in the world on foul brood. Dr. Phillips reported :—

The sample of brood arrived in excellent condition and, in view of the importance to the beekeepers of your country, has been subjected to an examination much more careful than is usual for routine samples. The irregular appearance of the brood would indicate an abnormal condition but the gross appearance and microscopic and bacteriological examinations of the brood all fail to show any evidence of either of the infectious diseases

Meanwhile members of the South African Beekeepers' Association sent samples of brood to Dr. Maason and Prof. Lauder, two eminent European authorities, and under date of 4th January, 1912, the Secretary of the Association wrote to the Division :—

Since then we have heard from Dr. Maason who states that not only is any sign of foul brood absent but that in his opinion the disease is not of a contagious nature. To-day we have received the report of Professor Zander who agrees with Drs. Maason and Phillips that foul brood does not exist, but thinks that it may be a disease new to science. We have evidence that the disease has existed in South Africa for at least eighteen months, and at present is at Capetown. So far as we know no bees or used appliances have been removed from the Transvaal to the Cape, so that it would appear, whatever the cause, it is fairly widespread. One characteristic of the disease is that it suddenly disappears, without curative measures being adopted, and another that even in the early stages napthol-beta as recommended for foul brood has no effect.

With the object of keeping in touch with the trouble, whatever it is, the Division engaged Miss M. Dagmar Sillar, late Apiarist at the Government Farm, Grootvlei, near Bloemfontein, to spend a fortnight in May, 1912, in inspecting apiaries in and near Johannesburg. Miss Sillar was the first person to express an opinion that the trouble was foul brood, and she persisted in this opinion, when after a delay of several months, she reported from England the detail of her inspection. Under date of 14th January of this year she wrote :—

I am very sorry but I must tell you that I do not think there can be the least doubt but that the disease is foul brood in a mild form, for I have had both Messrs. Cowan's and Herrod's opinion and Dr. Graham Smith's and other authorities and they say it is undoubtedly foul brood, though it may differ slightly from the disease at home owing to climatic conditions.

Miss Sillar's detailed report, however, does not suggest foul brood to me or even a trouble of serious importance. and I think it safe to accept the finding of Dr. Phillips and the continental authorities. The South African Beekeepers' Association has been asked to keep the Division posted in regard to the trouble and also to supply me with a typically diseased comb should a badly affected hive ever come to the notice of any of the members.

The disease in question is described as follows in a letter, from a prominent member of the South African Beekeepers' Association, which Miss Sillar included with her report :—

The first thing noticed on opening a colony is that the larvae do not have the pearly white look about them, but look very dull in appearance. This is only after the fifth or sixth day from the hatching of the eggs, when the food is being changed by the nurse bees. After a few da·s the larva has a yellow stripe on it and gets very watery in appearance, and it then dries down into a coffee colour and shrivels up. The bees remove the remains, for I have when experimenting found the next day on visiting the same hive a considerable quantity of the dried-up mass removed. When the larvae are full grown there are quite a number of them upside down in the cells. It seems as if they are neglected by the nurses and as if they then turned round in search of food and, remaining in this position, die. Strange to say that when in this position they are sometimes sealed over but in every case I have found the capping perforated right in the centre. It looks just as if the cap was not finished instead of being torn open. The nymphs are often found dead and dried up, and rarely also fully formed bees; but the trouble seems to attack the larvae mostly. One of the strangest things

on examining a hive is that whenever it is opened there are always a quantity of eggs and sealed brood, and very few larvae. The disease seems only to affect the weak stocks very badly. Strong stocks seem to keep it down but perhaps this appearance is due to there being more bees in the hive to remove the dead larvae. One thing in particular may be said and that is that the trouble seems to knock all the go out of weak stocks, for as soon as it appears they seem to lose all their energy, and consequently it gains on them. The queen lays very irregularly and I have found from five to eight and ten eggs in one cell. The chief characteristics of foul brood, namely odour and ropiness, are entirely absent. I have only on one occasion found a dead larva that could be drawn out and it stretched quite 1½ inches and then broke like a piece of elastic. During the early part of the morning a good many mature bees fa l down in the front of the hive. Their abdomens are very swollen and when pressed a quantity of matter just like undigested pollen issues therefrom. I at first thought they had dysentery. Often when diseased colonies are being examined they drop this yellow excretion all over the clothes and hive. I have treated all colonies as for foul brood and fed medicated syrup, but in every case after a few weeks, as soon as the stock became weak and a little short of stores, the disease again appeared.

# Recent Soil Investigation in the Cape Province.

By Dr. C. F. JURITZ, M.A., F.I.C., Chief Chemist, Cape Province.

(*Continued from page 49.*)

## HUMANSDORP.

A SAMPLE of soil, No. 144, was taken on the farm Long Kloof, in the Hankey District, whence good crops had been taken for the last 30 to 40 years without manuring. The land had recently suddenly given out, and the sample was therefore taken for analysis with the object of definitely ascertaining the cause of this collapse. Samples Nos. 145 and 146 were collected on the farm Thescombe, the former being the surface soil to a depth of eight inches, and the latter representing the sub-soil to a depth of twenty-four inches. These three soils were analysed in the usual manner, with the following results:—

| No. | Percentage of Field Sample. | Percentage of Soil sifted through 1 mm. Sieve. | | | | Percentage of Soil sifted through ½ mm. Sieve. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fine Earth below ½ mm. | Water. | Organic Matter. | Chlorine. | Nitrogen. | Lime. | Magnesia. | Potash. | Phosphoric Oxide. |
| 144 | 100 | 5·28 | 5·42 | ·016 | ·091 | ·158 | — | ·099 | ·014 |
| 145 | 98·1 | ·49 | 2·00 | ·0014 | ·098 | ·066 | — | ·019 | ·042 |
| 146 | 98·1 | ·24 | ·83 | ·0007 | ·056 | ·038 | — | ·035 | ·020 |

In No. 144 determinations of potash and phosphoric oxide were also made by extraction with a solution of citric acid (Dyer's method),* with the result that the soil was found to contain .016 per cent. of readily available potash and .009 per cent. of readily available phosphoric oxide. The soil was distinctly poor in phosphatic material. Lime and potash were present in fair amount. Nos. 145 and 146 are poor in all the essential constituents of plant food, and stand in need of general manuring.

### KIMBERLEY.

Nos. 147, 148, and 149 were taken from the Estate of the New Vaal River Diamond and Exploration Co. at Sydney, near Kimberley. The intention was to utilize the soils referred to for tree culture, with a view to the production of mining timber. Only lime, potash, and phosphoric oxide were determined, the usual methods yielding the following results:—

| No. | Lime. | Potash. | Phosphoric Oxide. |
|---|---|---|---|
| 147 | 1·245 | ·240 | ·081 |
| 148 | ·585 | ·210 | ·067 |
| 149 | ·087 | ·121 | ·040 |

Of these soils No. 147 is the best and 149 the worst. If used for purposes of general cultivation Nos. 147 and 148 would be considered of medium quality as regards phosphates, and No. 149 poor. In lime too No. 149 is rather deficient, while Nos. 147 and 148 are well supplied. The proportions of potash are satisfactory in Nos. 147 and 148, and fairly so in No. 149. For arboriculture soils will, as a rule, do well with less proportions of plant food than are needed for general purposes, and, from a chemical point of view, Nos. 147 and 148 should not prove to fall short in these respects.

### KINGWILLIAMSTOWN.

Sample No. 150 was collected on Mr. J. Andreka's property in the Kingwilliamstown Division; it was taken from an orchard which was alleged to have been injuriously affected by water from a borehole in the vicinity. The composition of this water was found to be as follows, the figures being calculated in grains per gallon:—

| | |
|---|---|
| Total solids ... ... ... ... | 115·8 |
| Silica ... ... ... ... ... | 1·56 |
| Alumina and oxide of iron ... ... | ·18 |
| Lime ... ... ... ... ... | 11·86 |
| Magnesia ... ... ... ... ... | 7·22 |
| Alkalies (calculated as $Na_2O$) ... ... | 36·74 |
| Chlorine ... ... ... ... ... | 49·59 |
| Sulphuric oxide ... ... ... ... | 3·65 |
| Carbon dioxide ... ... ... ... | 10·60 |

In the soil the total water-soluble salts amounted to .088 per cent., of which .013 per cent. consisted of sodium chloride, calculated

* "Agricultural Soils of Cape Colony," p. 60.

from the chlorine present. It would, therefore, appear that, at the surface at least, the soil is free from brack. The texture of the soil, moreover, is such that even if a fairly brack water were used for irrigation it could easily be drained off by a proper system. Without suitable drainage, in view of the fairly high salinity of the water, repeated irrigation might have the effect of markedly accumulating injurious salts.

On page 67 of my "Agricultural Soils of Cape Colony" an analysis of a black loam soil from the forest station at Evelyn Valley was recorded. After the lapse of eight years another sample of soil was taken from as nearly as possible the same locality, and, except for a considerable difference in the percentage of chlorine—which was rather abnormal, from some unexplained cause, on the previous occasion—the results were found to agree closely. The sample, No. 151, was a black and very clayey virgin soil, taken above the old trout hatchery, so as to represent the profile of the surface soil to a depth of twelve inches. A partial mechanical analysis of this sample gave the following figures:—

| No. | Pebbles, > 3 mm. | Gravel and Coarse Sand, 3–½ mm. | Fine Earth, < ½ mm. | Nature of Pebbles and Gravel. |
|---|---|---|---|---|
| 151 | 3·62 | ·93 | 95·40 | Decomposed ferruginous slate and chert. |

Analysis for plant food constituents resulted as follows:—

| No. | Percentage of Field Sample. | Percentage of Soil sifted through 1 mm. Sieve. | | | | Percentage of Soil sifted through ½ mm. Sieve. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fine Earth below ½ mm. | Water. | Organic Matter. | Chlorine. | Nitrogen. | Lime. | Magnesia. | Potash. | Phosphoric Oxide. |
| 151 | 95·40 | 6·84 | 17·81 | ·0032 | ·336 | ·025 | ·049 | ·068 | ·130 |

Similarly to the sample previously analysed, this sample had remarkably high proportions of organic matter and nitrogen. The proportion of phosphoric oxide was also quite satisfactory, but lime, on the other hand, is deficient in the soil. Its proportion of potash is fair. The amount of injurious ingredients—chlorine and total soluble salts—have ceased to be excessive, the proportion of water-soluble salts being only .034 per cent.

It is evident from the above percentages that this soil, if cultivated, would require the addition of burnt lime or crushed limestone. This would supply the deficiency of lime, and at the same time tend to neutralize the organic acids that are bound to be formed in the presence of so large an excess of organic matter, all the more if

aeration is not very thorough and moisture conditions doubtful. Amongst other ills resulting from such a combination of circumstances is the reduction of the iron in the soil from the state of ferric to ferrous compounds, a condition in which they are harmful to plant life.

### Maclear.

The samples, Nos. 152 and 153, were taken at Narrow Vale, Ugie. No. 152 was representative of a red soil which had grown one crop of maize and two of wheat; No. 153 was a type of light grey soil on which one crop of maize and three of oats had been grown. Neither of these two soils had received any manure whatever.

Nos. 154 to 159 represent six soils from the farm Umga Flats. The ground had never been manured or irrigated, and there are no signs of brack on any of these lands. No. 154, a rather stiff, brownish-red loam, locally known as "rooibult" was taken from a hillside where the soil varies from 14 to 16 inches in depth before the sub-soil is reached. Average crops of mealies, wheat, beans, forage, and potatoes have from time to time been raised on the adjoining lands, of which the sample is typical. The actual spot from which the sample was taken had, however, never been under cultivation. The sub-soil is of the colour of burnt brick, and in parts over 6 feet in depth. This sub-soil is more friable because seemingly more sandy than the surface soil. It is always loose, moist, and adhesive to the tools. No. 155 is a sample of this sub-soil taken at a depth of 17 to 20 inches. No. 156 represents a very clayey soil, whose surface is of a pale, yellow, ashen hue, but changes as it is penetrated, until at a depth of 12 inches it becomes more yellowish and gravel is met with. This soil, which was sampled on the top of a rise, had been discarded by previous owners as not worth ploughing, but had been under cultivation for two years previous to sampling. No crops had, however, been successfully grown on it. During the last two seasons referred to barley, wheat, forage, and mealies had been tried, but with very poor results. The sub-soil at this spot, whereof No. 157 is a sample, taken at 14 inches depth, is almost entirely pot clay; it appears to consist of a yellowish gravel, which disintegrates into a sort of clay when exposed to the atmosphere for a few weeks. This soil seems to consist largely of soft, decomposed clay slate, still showing the original bedding planes. No. 158, a nearly black and very clayey soil, was taken from a valley near a swamp. The depth of the surface soil here is seldom more than 13 inches, and the soil is commonly known as "black ground." During dry weather its surface crusts over. Mealies, beans, wheat, forage, and potatoes are usually grown. The sub-soil is a clay varying in depth up to 3 feet, and of this No. 159 was a sample. It is not as dark as the surface soil, and consists of hard lumps of stiff pot clay.

On pages 157 to 171 of "Agricultural Soils of Cape Colony" I endeavoured to trace the relations between the rocks of various geological series and the plant food content of the soils derived from those rocks. Certain peculiarities were noted, for instance, in the soils of the Malmesbury series, in those of the Table Mountain sandstone, in the soils of the Bokkeveld beds, and in the Witteberg soils. In default of the necessary investigation, the Burghersdorp and Stormberg series soils were grouped together. Amongst the many subjects still awaiting investigation in connection with the systematic

survey of the country's agricultural soils was that of the chemical composition, from an agricultural aspect, of the soils of the Stormberg geological series. In my address on "The Underground Waters of the Cape Colony"* I pointed out that the absence of soluble compounds in the rocks of the Table Mountain series account, at the same time, for the poor soils and the pure waters to which those rocks give rise. I also directed attention to the fact that the purest underground waters in the country are those of the Table Mountain and of the Stormberg series. Both these geological series consist essentially of sandstones, and the Table Mountain soils had been investigated and found to be chemically poor; it was to be expected that similar poverty would characterize the soils of the Stormberg series, but no investigation had yet been made of the latter, and so it was decided to proceed with such an investigation. The lowest rocks of the Stormberg series are the Molteno beds, which comprise shales and sandstones, the latter closely resembling Table Mountain sandstone. Above these Molteno beds, which are about 2000 feet thick, are the red beds of almost equal thickness. These red beds consist chiefly of red and purple mudstones and shales, and it was deemed possible that these, like the purple mudstones and shales at Nauwpoort† might yield richer soils than the Molteno sandstones below. It was therefore decided to commence the investigation along broad lines in the Maclear District, and afterwards, if there were an opportunity of entering into sufficient detail, to study the differentiation within the Stormberg series on the lines just alluded to, and, if still further detail could be studied, to ascertain the relative fertility of soils derived entirely from Molteno beds, or derived from Molteno beds diversified by dolerite intrusions, or else from red beds, and, moreover to compare these with the alluvial soils of the district. Before actually initiating the investigations, occasion was taken to consult Dr. A. L. du Toit, of the Cape Geological Survey, on the geological aspect of the subject, and from him I learnt that much of the deep red apparently very ferruginous soil rested upon Molteno sandstone and shales. Another point for investigation was the reputed fertility of the Cedarville Flats, while the soils around Maclear were said to be poor and sour. Further to the south-east, in the neighbourhood of Tsolo, the older rocks of the Beaufort series replace the Stormberg formation, and there, too, the soils are very fertile.

It was naturally impossible to investigate all these points at once, and so, as already indicated, a commencement was made on broader lines, and so twenty-one samples representing the district were obtained. In the following table they are numbered Nos. 160 to 180. All these samples represent Stormberg series soils, the majority being derived from the sandstones and shales of the Molteno beds, which, like the sandstone formation along the south-west coast of the Colony, produces typical sour veld soils. Nos. 160 to 162 were collected within the Field Cornetcy Tent Kop. No. 160 was taken on the farm Elands Height, and represented the red soil of the ridge overlying dolerite. This soil varies in depth from an inch or two to many feet—in some places over six feet—and covers an extensive area. I understand from Dr. Du Toit that this soil is derived from the basaltic lavas of the Drakensberg.‡ No. 161 was a black alluvial

* *Cape Agricultural Journal*, vols. 32 and 33.

† See pp. 89 and 90 of "Agricultural Soils of Cape Colony."

‡ Rogers and Du Toit: "Geology of Cape Colony," pp. 219-225.

or vlei soil occurring in conjunction with No. 160, but within a more limited area, and dispersed over the same country in depth varying from a few to many feet. These two soils represent a long stretch of the ironstone formation, keeping all along the flanks of the Drakensberg. Sample No. 162 was collected on the farm Kendal. Within the Field Cornetcy Upper Mooi and Pot Rivers, eight samples, Nos. 163 to 170, were collected. No. 163, from the farm Cornlands, represented a large portion of the cultivated lands in the ravines of the Drakensberg, and is fairly typical of the alluvial deposits in the ravines and rivers immediately under the Drakensberg. The sub-soil consists of alluvium ranging from 5 to 10 feet in depth, with sandstone formation and patches of purple shale showing along the river banks. No. 164 was taken from sandstone formation on the farm Fairbridge along the banks of the Little Pot River, and represents a large portion of the very poor and unproductive soils of the district. On the farm Truro two light coloured sandy soils, which are reputed to be poor, were collected; No. 165 was taken from a vlei and No. 166 from a hill. No. 167, also a poor soil, was collected on the farm Selo from lands on the Mooi River. The soil is shallow in some parts and in others of great depth, the underlying formation being soft sandstone. No. 168 was taken from Block No. 10, Mooi River, from an undulating ridge or sloping ground on the slopes of the Prentjes Berg. There is a great extent of similar ground in the district. The underlying formation is a coarse yellow-grey sandstone. No. 169 was taken from a spot about 50 yards from the previous sample. No. 170 was collected on the farm Feltham, about one mile due north of the previous samples and nearer the Mooi River. It was taken from an undulating ridge similar in character to that on Block No. 10, sloping from Prentjes Berg towards the Mooi River; the underlying formation is the same coarse sandstone. Six samples, Nos. 171 to 176, were collected in the Pot River Field Cornetcy. Of these Nos. 171 and 172 were collected on the farm Goodwood. No. 171 represented a poor brick-red sandy soil from a ridge running north below the main road. This type of soil is fairly well distributed all over the farm, and is underlain by a medium to coarse gritty sandstone. No. 172 is a rather light-coloured poor alluvial sandy soil taken from the valley below the main road on the extreme eastern portion of the farm where the same gritty sandstone already referred to underlies the soil. On the farm Wainwright, just below the Poultney beacon, a sample, No. 173, typifying the generally occurring poor light soil of the district was taken from mealie lands. No. 174 was a type of soil usually found on slopes where ironstone occurs; it was taken from mealie land adjoining Carlsbad. No. 175 was another poor soil of a type found in several places along the river banks in the district, and was collected from mealie lands on the bank of the Tsitsa River just above Carlsbad. No. 176, which was taken from lands in front of the homestead on the farm Wainwright, is typical of the general brick-red soil of the district. In the Field Cornetcy Wizard's Vale two samples, Nos. 177 and 178, were taken. The former was collected on the farm Fairlight, near the homestead. The sample may be considered typical of all the red soils in this field cornetcy, and varies in depth from 20 to 30 feet. No. 178 represents a light-coloured sandy soil—amongst the very poorest soils in the field cornetcy—and was taken from the farm Orpen within 50 yards of the lower wagon drift on the Cebenxa stream. Two samples,

Nos. 179 and 180, were taken in the Umga Field Cornetcy. No. 179 was collected on the farm Umga Flats from one of the many undulations which run from the farm towards the Umga River; the sample was chocolate-coloured and representative of that class of soil in this field cornetcy. It has a brick-coloured clayey-loam sub-soil which is uniform in character as far down as 80 feet. No. 180 was taken from that portion of the flats on the farm Middleridge which lies midway between the hills on that farm and those on the farm Narrow Vale. It was a sample typical of the poor sandy and gravelly soil which is found in most of the low lying parts of this field cornetcy. Its sub-soil is almost generally pure sand.

The twenty-nine soils may be grouped as follows: (1) Light-coloured soils, comprising Nos. 153, 156, 157, 166, 167, 173, 178, and 180; (2) light chocolate soils, including Nos. 162, 163, 165, 174, and 175; (3) dark chocolate soils, comprising Nos. 154, 160, 168, 169, 170; (4) black soils, Nos. 158, 159, 161, and 172; (5) red soils, Nos. 152, 155, 164, 171, 176, 177, and 179.

The usual agricultural chemical analyses were made in respect of the twenty-nine Maclear soils above described with the following percentage results:—

| No. | Percentage of Field Sample. | Percentage of Soil sifted through 1 mm. Sieve. | | | | Percentage of Soil sifted through ½ mm. Sieve. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fine Earth below ½ mm. | Water. | Organic Matter. | Chlorine. | Nitrogen. | Lime. | Magnesia. | Potash. | Phosphoric Oxide. |
| 152 | 91·9 | 1·71 | 3·51 | ·001 | ·168 | ·080 | — | ·055 | ·033 |
| 153 | 90·1 | ·71 | 1·78 | ·001 | ·070 | ·050 | — | ·047 | ·079 |
| 154 | 99·6 | 1·96 | 5·47 | ·0139 | ·158 | ·122 | ·094 | ·042 | ·059 |
| 155 | 99·3 | 2·43 | 4·49 | ·0298 | ·098 | ·057 | ·076 | ·048 | ·061 |
| 156 | 90·3 | 1·25 | 3·41 | ·0100 | ·119 | ·045 | ·063 | ·036 | ·023 |
| 157 | 97·5 | 1·52 | 3·52 | ·0402 | ·098 | ·060 | ·151 | ·039 | ·032 |
| 158 | 99·5 | 1·88 | 5·66 | ·0156 | ·182 | ·137 | ·085 | ·011 | ·040 |
| 159 | 96·1 | 2·07 | 4·58 | ·0217 | ·077 | ·172 | ·124 | ·021 | ·022 |
| 160 | 91·7 | 7·85 | 14·96 | ·038 | ·315 | ·014 | ·014 | ·054 | ·075 |
| 161 | 98·1 | 11·34 | 19·11 | ·035 | ·518 | ·414 | ·029 | ·042 | ·073 |
| 162 | 96·7 | 2·29 | 6·32 | ·005 | ·084 | ·018 | ·022 | ·042 | ·070 |
| 163 | 98·6 | 5·50 | 9·93 | ·007 | ·210 | ·400 | ·636 | ·064 | ·160 |
| 164 | 96·7 | 2·28 | 3·88 | ·037 | ·084 | ·006 | ·027 | ·034 | ·051 |
| 165 | 98·2 | 2·68 | 5·82 | ·032 | ·112 | ·006 | ·001 | ·040 | ·034 |
| 166 | 99·1 | 1·58 | 4·22 | ·005 | ·126 | ·002 | ·001 | ·019 | ·061 |
| 167 | 99·0 | 2·46 | 4·13 | ·006 | ·105 | ·116 | ·032 | ·049 | ·054 |
| 168 | 97·8 | 3·24 | 6·96 | ·003 | ·154 | ·004 | ·011 | ·036 | ·050 |
| 169 | 97·7 | 3·23 | 6·78 | ·003 | ·126 | ·002 | ·015 | ·041 | ·054 |
| 170 | 99·4 | 3·32 | 7·04 | ·003 | ·133 | ·008 | ·016 | ·039 | ·043 |
| 171 | 96·5 | 2·17 | 2·14 | ·003 | ·035 | ·004 | ·014 | ·024 | ·034 |
| 172 | 82·5 | 2·17 | 6·77 | ·003 | ·119 | ·010 | ·013 | ·026 | ·036 |
| 173 | 96·9 | 1·56 | 4·40 | ·006 | ·084 | ·022 | ·021 | ·019 | ·032 |
| 174 | 94·3 | 3·80 | 6·33 | ·004 | ·091 | ·114 | ·048 | ·054 | ·063 |
| 175 | 95·9 | 1·45 | 3·59 | ·003 | ·056 | ·060 | ·024 | ·033 | ·029 |
| 176 | 92·3 | 3·07 | 7·47 | ·003 | ·105 | ·014 | ·001 | ·037 | ·024 |
| 177 | 97·3 | 2·53 | 4·32 | ·005 | ·084 | ·014 | ·014 | ·039 | ·069 |
| 178 | 93·4 | 1·34 | 2·04 | ·005 | ·063 | ·038 | ·019 | ·027 | ·040 |
| 179 | 99·1 | 2·60 | 4·03 | ·003 | ·105 | ·052 | ·028 | ·043 | ·040 |
| 180 | 97·2 | 1·35 | 2·76 | ·006 | ·070 | ·046 | ·002 | ·027 | ·043 |

Of all these soils only Nos. 161 and 163, the alluvial soils of the Drakensberg, may be said to be adequately supplied with lime. There are moderate proportions of lime in Nos. 154, 158, 159, 167, and 174, but the soils of practically the entire Upper Mooi and Pot Rivers Field Cornetcy contain the merest traces of lime. All the soils lack potash, only four of them—belonging to the chocolate-coloured groups—reaching above .05 per cent. No. 163 is the only soil of the series which is well, or even normally, supplied with phosphoric oxide. Of the remaining soils all (except seven) are deficient in phosphoric oxide, the exceptions being No. 153, the three Elands Height soils (Nos. 160, 161, and 162), and Nos. 166, 174, and 177. In nitrogen Nos. 160 and 161 are rich, and No. 163 is also well supplied, several of the remaining soils being well within normal limits. All the Upper Mooi and Pot River samples (Nos. 163 to 170), except No. 164, are normally supplied with nitrogen, and, generally speaking, the soils of the Wizard's Vale and Umga Field Cornetcies have a fair proportion. In inorganic plant food, however, all the soils of the Field Cornetcies Upper Mooi and Pot Rivers, Pot River, Wizards Vale, and Umga Flats (including samples Nos. 164 to 180) may be pronounced poor. Soils derived from rocks like clayslate and sandstone would naturally contain far less phosphoric oxide than doleritic soils. This deficiency must be made good by the admixture of fertilizers like basic slag or superphosphates, and in addition, as already indicated, the need of potash fertilizers is clear from the analytical results. To supply this defect in the soils employment of about 65 lb. per acre of sulphate of potash was recommended, and as a source of phosphoric oxide about 250 lb. of superphosphates or (in case immediate results were not essential) 300 lb. of basic slag was suggested. Where nitrogen was lacking, 50 to 100 lb. of Government guano, or a larger quantity of kraal manure, was advised, with the proviso that if basic slag were used at least a fortnight should intervene between the two applications.

Of the first eight soils partial mechanical analyses were made with the following percentage results:—

| No. | Pebbles, > 3 mm. | Gravel and Coarse Sand, 3–½ mm. | Fine Earth, < ½ mm. | Nature of Pebbles and Gravel. |
|---|---|---|---|---|
| 152 | ·77 | 7·34 | 91·89 | — |
| 153 | 5·86 | 4·09 | 90·05 | — |
| 154 | ·04 | ·35 | 99·61 | Ferruginous slates and |
| 155 | Nil | ·73 | 99·27 | fine-grained sandstone. |
| 156 | 1·50 | 8·16 | 90·34 | Weathered slates, sand- |
| 157 | ·06 | 2·44 | 97·50 | stone, and magnetite. |
| 158 | ·02 | ·49 | 99·49 | Slates, sandstone, and |
| 159 | 2·88 | 1·08 | 96·14 | quartz grains. |

The following determinations of total water-soluble salts were made:—

| No. | Total Soluble Salts. |
|---|---|
| 154 | ·116 |
| 155 | ·146 |
| 156 | ·088 |
| 157 | ·144 |
| 158 | ·140 |
| 159 | ·077 |

Brack salts would seem to be rather high, especially in No. 157, which showed .04 per cent. of chlorine. In such cases special attention to drainage is needed.

### NAMAQUALAND.

The soil No. 181 was taken, as a mixed sample, to a depth of about six inches from three separate spots representing one extended area at Henkries, which appeared too brack to support vegetation. The rainfall is exceedingly scanty, probably not more than about four inches per annum. Analysis of this soil for water-soluble salts gave the following percentages:—

| No. | Sodium Chloride. | Sodium Sulphate. | Sodium Carbonate. | Total Alkali Salts. | Magnesium Chloride. | Magnesium Sulphate. | Magnesium Carbonate. | Calcium Chloride. | Calcium Sulphate. | Calcium Carbonate. | Total soluble salts by analyses. | Total soluble salts by weighing. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 181 | 5·227 | Nil | Nil | 5·277 | ·627 | Nil | Nil | 1·576 | 2·665 | ·150 | 10·295 | 10·250 |

In fact the alkali salts in this soil are more than seventeen times as much as in the worse of the two soils from the Beaufort West Division referred to on a previous page.

Calculating from the above figures, the percentage composition of the efflorescent salt at the soil's surface at Henkries would be as follows:—

| | |
|---|---|
| Sodium Chloride ... ... ... ... ... | 51·25 |
| Magnesium Chloride ... ... ... ... | 6·09 |
| Calcium Chloride ... ... ... ... ... | 15·31 |
| Calcium Sulphate ... ... ... ... ... | 25·89 |
| Calcium Carbonate... ... ... ... ... | 1·46 |

The impossibility of any vegetation growing in such a soil is easily accounted for by the exceedingly large proportion of brack salts, especially in view of the presence of the chlorides of calcium and magnesium. The occurrence of the latter soluble salts in brack has already been reported in arid regions such as those of Van Wyks Vlei and Thebus.*

* *Vide* "Agricultural Soils of Cape Colony," p. 187.

(*To be continued.*)

# The Possibility of a Petrol Famine.

## HOW THE FARMER IS CONCERNED.

[THE following article, by Mr. Victor Hart, is taken over from a recent issue of the *Midland News*. The situation, as outlined by Mr. Hart, is one full of interest for our farmers, particularly sugar-planters, in view of the possibility that denatured alcohol may come to the fore as a substitute for petrol. We refer to this matter more fully in our Editorial Notes in this issue, showing how farmers are concerned in the question.—ACTING EDITOR, *A.J.*]

Do motorists sufficiently realize that there is a likelihood, in the very near future, of a dearth of petrol? I put this query because the subject is of vast importance not only to pleasure car owners but to users of agricultural machinery and a number of trades and businesses where the internal combustion engine is in daily increasing demand. Reliable statistics place the total of the world's supply of petrol, during 1912, at 625,000,000 gallons, an increase of about 9,000,000 gallons over the preceding year. These huge quantities are obtained, as regards about two-thirds of the total, from the United States of America and the balance is made up from the Baku oil field in South Russia, Roumania, and Sumatra. Up to some eight years ago the only source of supply for petrol was the United States, and at one time there seemed a likelihood of the country being able to supply an unlimited demand because new fields were being frequently opened up, of which the most recent is that in Southern Texas. But despite such new fields, the older ones are being exhausted in the same ratio as the newer ones reach the producing stage, and the main increase comes from Sumatra, the supplies from Russia and Roumania only reaching a small proportion of the total.

As most people are aware, petrol is distilled from the same crude oil which produces paraffin, each ton of the "crude" (as it is called by technical men) giving forth about ten per cent. of petrol, and it is this comparatively small percentage which is partly accountable for the prospect of something like a veritable oil famine. The reason of this state of affairs is traceable to the enormous increase in the number of motor cars and motor cycles in every country of the world, more particularly in America, and instead of being the largest exporters of petrol—as was the case less than five years ago—only a small amount is sent to other countries, its home demand accounting for most all its own production. Outside America, the largest consumer is Great Britain with 81,000,000 gallons in 1912, Germany taking about half that quantity, with France a little lower down the scale and all other countries a long way behind in the totals of consumption. Much of the British demand has been created by the tremendous increase in the number of motor wagons and motor buses, and in London alone one omnibus company running over 2000 vehicles uses 6,000,000 gallons a year, about equal to all the petrol that comes into South Africa.

The position is further complicated by the sudden development in the use of internal combustion engines for ship propulsion and similarly the

large number of submarine vessels belonging to the war navies of all countries with seaboards. But worse still is the unfortunate fact that pretty well the whole crude oil fields in the world are controlled by two gigantic financial trusts (the Rockefeller group in America and the Rothschild group in Europe), and by reason of the demand now keeping pace with supplies or slightly exceeding such demand there has been a continual tendency to increase the price per gallon. Four years ago in England, 11d. was the figure, and it is now 1s. 6d., whilst paraffin has also increased in cost, although not to the same extent.

The suggestion has frequently been made by those enthusiasts who have not troubled to study the subject that the solution of the problem now facing motorists would be to so design carburettors that paraffin could be used for fuel with the same facility as is petrol to-day. These well-meaning folks overlook the dominating factor in the situation, i.e. a bigger demand for paraffin will inevitably send up the price to that paid for petrol, because the two "trusts" control all available supplies of both fuels. Moreover, the odour from paraffin practically prohibits its use on pleasure cars and motor cycles, this disadvantage not applying to motor wagons, many of which utilize a mixture of petrol and paraffin, an instance in this country being the South African Railway motor wagons working in Johannesburg and Capetown.

# Agricultural Co-operative Union, Limited.

## ANNUAL GENERAL MEETING.

THE annual general meeting of the Agricultural Co-operative Union, Limited, was held at Maritzburg on the 9th July, with Sir Thomas Hyslop (President) in the chair. The following is the president's report, to which reference is made in our editorial notes this month :—

I now rise to move that the report and balance-sheet for the year ending 31st March, 1913, be taken as read, and adopted. I am very glad, in moving this resolution, to be able to state that the rate of progress during the past year has been highly satisfactory. I have had no desire to see an unduly rapid advance, as in all new undertakings I think "hasten slowly" is a capital motto. After every move forward it is desirable to consolidate in case too hasty progress should lead to disorganization. The financial year commenced with a membership of 580, and ended with 936. To-day the membership is 1024. The turnover for the year was £174,900, an increase on the previous year of £78,200. The benefits of the union are being appreciated far afield, as farmers in the Transvaal, Free State, and East Griqualand are joining freely. The net profit for the year is £854. 14s. 3d. As our object is not to make money, but to buy cheaply and sell for our members at little expense, I think you will agree with me that this result is entirely satisfactory. There have been no bad debts

incurred during the year, and only one or two of small amount which may be considered doubtful. The executive committee recommend that £300 be carried to reserve account, which, added to the amount standing to the credit of the fund, makes a total of £363. 1s. 11d. The committee considered the question of paying a dividend on the share capital, but decided not to recommend this owing to the clerical work connected with paying out interest on such small amounts. As you are aware, many members have only paid up the first call of 10s. per share, and it was considered undesirable to pay out on such a small amount.

Owing to the rapid increase of our members, it will again be necessary to increase the registered capital of our company. As I explained last year, there is a provision in our limited liability laws, under which we are registered, that three-fourths of the share capital of a company must be applied for before registration takes place. This condition was never meant for societies such as ours, and is certainly a very inconvenient one, as it necessitates constant increase of capital. There is, however, no way of getting out of it, and you will be asked to pass the necessary resolution at the end of this meeting.

The *Agricultural Gazette* has been published regularly during the year, and has been sent weekly free of cost to each member. Judging by the number of inquiries in connection with its contents, it has been found of much service. It certainly forms a very useful connecting link between the management and members. Recently an amalgamation has been arranged with the *Natal Farmer*, and the paper in its new form should prove even more attractive and useful than in the past.

During the year only one credit association was formed to obtain fertilizers on terms. In this case six farmers bound themselves to mutually guarantee the total requirements, and in this way obtained prolonged credit. Owing to the expression of opinion at last annual meeting, the executive committee revised the rules applying to these associations, and reduced to three the number of members who may apply for the formation of a credit association. Since the end of the financial year other six applications have been approved of, and the current year's fertilizers will be obtained on credit by the associated members.

Perhaps the most serious difficulty we had to contend with during the past season was the late arrival of some of our fertilizers. Owing to the dockers' strike in England, some of the manufacturers experienced great delay in obtaining their raw material, with the result that they were unable to complete their contracts in time. The assistance of our members made it possible to avoid any serious loss. An unfortunate feature, however, was that some of the fertilizers had not been stored long enough to eliminate the crudeness of the acid, with the result that many of the sacks were injured. Superphosphate, especially very high grade, always destroys the bags more or less, and members should not expect to get every bag in as good condition as when mealies are the contents. In connection with superphosphates, especially that of very high grade, I would warn members that there will almost certainly be trouble if distributed by a mealie planter. New beginners are always inclined to think there is something wrong with the fertilizer when clogging takes place, but this is not so. It is generally desirable to mix this class of manure with bone dust or even dry earth if the mealie planter is to be used.

Last year owing to the prevalence of foot-and-mouth disease in England and the Continent very few cattle were imported by the union. During the last few months, however, the restrictions having been removed, many

members are taking advantage of the opportunity of importing freight free. The selections of our agents in England have given satisfaction except in one respect. On being tested for tuberculosis, some animals have reacted notwithstanding the fact that they were tested before leaving England. I have heard of a number of similar happenings amongst animals imported direct by farmers, and the only conclusion one can arrive at is either that tuberculine is not an infallible test or that the animals have been fortified by the owners in England before they were tested there. I trust that the Government will at once give effect to the intention of establishing its own testing camp in England, and so save importers the serious losses they are sustaining at present.

You will remember that last year I spoke of the possibility of the union taking up the business of the insurance of the live stock of members. The executive committee has had some hesitation in undertaking the financial responsibility without the fullest inquiry first. The position now is that in all probability operations will in the near future be started on a small and tentative scale.

I have pleasure in intimating that the union have engaged as traveller Mr. W. C. Mitchell, who has for some years past been farm manager at Cedara. Those amongst you who know Mr. Mitchell will be aware that he is fully competent to advise farmers in many matters connected with the farm, and I trust that you will all give him every assistance in your power by telling him the best means of overtaking the work in your district.

In initiating a movement of this description there are a great many difficulties to overcome. Agricultural co-operation has in every country during its early days had to encounter prejudice, suspicion, and sometimes hostility. It is perhaps not surprising that we should have to encounter these feelings on the part of traders who may consider their personal interests affected, but one would not expect to find agriculturists harbouring feelings of resentment against the union, yet I regret to say that this is the case in some quarters. Even amongst our members one occasionally hears remarks that might lead one to infer that the union was an enemy to be watched rather than their best friend. Thoughtless remarks such as I refer to are most discouraging to the members of the various committees who give a lot of time and thought to looking after the interests of members. I am glad to say, however, that as time goes on more and more of the members are obtaining such confidence in the management that they place their orders without hesitation, knowing that their interests will always be protected. Notwithstanding the experience of other countries on the continent of Europe, and of late years in Great Britain, where co-operation has invariably enormously increased the agricultural development, it is difficult to persuade the average agriculturist that he stands to gain anything in his own line of business unless he can be given a practical demonstration of the advantages as regards price and quality which co-operative purchase will give him. The advantage must be tangible and immediate, as any prospective gain in the shape of a bonus will be insufficient to induce him to make any change in the business methods of the past. It is this suspicion of change and distrust of any conclusion not vouched for by personal observation that partly accounts for the fact that so many farmers do not more actively associate themselves with the movement. Even those farmers who still remain outside the union derive considerable benefit from its existence, as the result of our operations has in many cases been to lower the price of agricultural requirements all over

the country. As an instance of this I will refer you to the great reductions which have been made in the price of fertilizers by competing firms. Some of them await the issue of our circular quoting the prices for the season, when they follow suit, cutting as near our figures as they can afford. Even those farmers therefore who are not members reap benefit from the existence of the union.

Owing to the rapid development of business, it has been necessary to make considerable increase to the staff. In the earlier part of the year also it was found necessary to make several changes in the occupant of the position of head book-keeper. The result of these changes have been at times some confusion in the accounts. In the circumstances, with such a large number of members of the same or similar names, some mistakes will always occur. Now that the staff has become more accustomed to their work and to the men who trade with the union, mistakes become less and less common, and I hope that in future there will be little cause to complain on this score. It takes time to work out the best methods of conducting a large, quickly-increasing business, and I think we may congratulate ourselves that the work has proceeded as smoothly as it has.

In all new businesses improvements suggest themselves from time to time, and in our case the experience gained during the past two years puts us in a much more favourable position to do the business of our members. As time goes on I have no doubt that we shall be able to save more and more for the farmers. There are two essentials which are absolutely necessary for the success of any co-operative society. The first is that it should be carried on on ordinary sound business principles, and the second is that it should have the continued and loyal support of its members. With regard to the management of this union, I may say that the principle that has guided us has been the building up of the business by degrees. We have always endeavoured to see our way clear before embarking on anything new, still we have always kept our eyes open in the direction of development. I think I can safely say the various committees have done their share. Is it too much to ask members generally to loyally support them by placing their business with the union? As an instance of the want of loyalty, I would refer to members who, after getting a price from us, go to merchants and inform them that they can buy from us at so and so—a price which, in the ordinary course, is lower than would be quoted to the farmer direct—and ask for the goods at the same figure. All this to save the small commission charged by the union. This is unfair to the merchant, who cannot afford to sell to the individual at wholesale rates, and is certainly not playing the game with the union.

The business of agricultural co-operation must always be in some degree contentious, since its principal object is to organize a particular class of the community and thereby render that class more competent to gain its fair share of the profits of its work. Although experience in other countries has shown that this process is beneficial to the whole nation—to the commercial as well as the agricultural classes—yet there has always been and probably will be a certain amount of opposition on the part of particular interests to the work we are engaged in. During the year some of the chambers of commerce have discussed the question with a view to some inimical action being taken, but I am glad to say the broader-minded men have realized that the movement is not only a legitimate one, but one that will benefit even the commercial community. I confess to having some sympathy with the up-country storekeepers who must undoubtedly find the union a formidable competitor. Even they,

however, will ultimately benefit as they will see the farmers around them become more prosperous through having a larger difference between the cost of production and the prices realized. In just such proportion as the growers have more money to spend, the shopkeepers may expect to do a larger business with them in necessaries and luxuries for the household. Any falling off in business in some directions should be abundantly compensated for by an increase in others, and in this way the retail trader would really stand to gain rather than lose by the new conditions. On the surface the country storekeeper has, however, something to complain of, but I confess I cannot see what reason there is for a hostile feeling in Maritzburg. The union has, with a view to causing the least possible disturbance of existing trade arrangements, laid down a principle that wherever reasonable terms are given locally direct importation will not be undertaken. Further, it suits us to deal in this town rather than in Durban if goods can be obtained on similar terms. Unfortunately, some of the traders refuse to recognize the fact that we have come to stay, and that our custom is worth catering for. The fact that we have members in the Transvaal, Free State, East Griqualand, and Swaziland who buy through us ought surely to bring home to local merchants the fact that they have an opportunity of securing business which, without the union, would never be got by them. In this connection I should like to quote an extract from a speech delivered by Earl Grey at Salisbury in August last year :—

"An idea which seemed to exist in some quarters was that the farmer should consent to be mulcted for the benefit of the storekeeper. He recognized no such necessity. The storekeeper was not a producer. He existed to help the farmer, and not the farmer to help the storekeeper. The farmer, like the manufacturer, should be helped to buy the articles he required on the lowest possible terms, and he should also be helped to sell his produce in such a way as would secure him the highest possible percentage from the consumer."

As a matter of fact, gentlemen, the farmer is a manufacturer, and ought to buy his raw material—manures, implements, seeds, grain bags, etc.—in the cheapest market, and sell his manufactures in the dearest. What seems to be expected, however, is that he should buy his raw material at retail rates and sell his produce at wholesale ones. No industry can be as prosperous as it ought to be under these conditions. Do not fancy for a moment that I want to eliminate the middleman. The middleman is as necessary as the producer, but there can be too many making profit between the manufacturer or the farmer and the consumer. It seems to be the opinion of some that the greater the number of people who make a living out of an article the better. I am entirely opposed to this theory. When an article passes through too many hands, the cost to the consumer is too great, and production is hampered. As an instance, I would refer to a popular make of cream separator with which I am acquainted, out of which no less than five profits are made between the manufacturer and the farmer. The result of the elimination of some of these intermediaries would be a better profit for the manufacturer and a more reasonable price for the farmer. The surplus middleman would be much better employed either on the farm or in the factory. As far as we farmers are concerned, we are not afraid of competition, and would gladly welcome them on the land.

There is a good deal of talk of the desirability of closer land settlement. Though I am a strong advocate of a sub-division of the land and

an increased white population, I am bound to admit that a great many men talk impractical nonsense in this connection. There is one thing quite certain, however, and that is, that the greatest possible inducement to the settlement of an increased population on the land is to make farming a more profitable business, and our efforts certainly tend in that direction. We endeavour to cheapen the cost of production by procuring for our members their requirements at lower rates, and by assisting them to sell in the best available market. In developing this movement we are not trying an experiment, as we can see the result of similar movements in older countries. I think Denmark was responsible for the origin of the movement, when in 1865 some of the best minds in that country boldly tackled the problem and devised a national scheme of co-operation amongst agriculturists, having for its object the reduction of the expenses of production and marketing to a minimum, and the securing of uniformity and reliability of quality in the produce. Agricultural co-operative societies were formed, purchases of requirements were made in bulk, co-operative factories for the manufacture of butter and bacon were erected with up-to-date machinery installed and presided over by expert managers. The members stood loyally by one another and their societies, and before long it was possible to place on the English market butter and bacon of a reliable and uniform quality, which quickly established a reputation and met with a ready demand. Other Continental countries, seeing the success, followed suit, but it was not until some twenty years later that any attempt was made to introduce the system into the United Kingdom. Then, through the instrumentality of Sir Horace Plunkett, the movement was started in Ireland, and though in early years it encountered much opposition and progress was slow, it has now obtained a remarkable hold, and has been the means of transforming the condition of a large part of the island from dire poverty to comparative prosperity. Irish agricultural produce now holds a recognized position in the English market similar to that obtained by the Danish. During the last few years the movement has been making rapid advance in England. Till quite recently the doctrine of "laissez-faire" dominated her statesmen, but all that is now changed, and the State is now busily engaged in extending its activity among the rural population, regulating, educating, and assisting them in every way. Owing to the predominance of urban interests and urban thought, it was perhaps natural that the town population should in England receive attention before an attempt should be made to reform the farmers' business methods. Of late years, however, numerous co-operative societies have been formed, and are working on much the same lines as this union, and a central body named the Agricultural Organization Society has been established for the express purpose of organizing co-operation and starting new societies throughout the country. The services performed by this body are considered so important that it receives a large grant from the Government to aid it in carrying on its work. The great change that has come over public opinion in England is evinced by the utterances of public men. As an instance of this I give the following, taken from a speech of the Right Hon. A. J. Balfour, delivered in January last :—

"Co-operation is more and more becoming an obvious and plain necessity if agriculture in this old country is to hold its own against all the competing influences brought against it. Money devoted to it is not wasted—is not money thrown into the sea."

The introduction of co-operation in agriculture in older countries has

led to immense developments and greater prosperity. Is it too much to hope that similar results will be obtained here?

The organization of farmers for business purposes is fostered, encouraged, and assisted in a variety of ways by Continental Governments. The Government of Great Britain is now giving active support to the movement, and our own Government has a department for the supervision of agricultural co-operation in the Transvaal and Free State. We on our part do not seek any monetary assistance, nor do we require any supervision. All we ask is that the Government should lend us aid in opening up new markets, in supervising the grading of our products when they are exported, in conducting scientific investigations into the best form in which we can market our produce, and in assisting us to cope with the diseases and pests which hamper development. I think we have a legitimate claim on the Government for consideration in these respects, as the work we are engaged in saves the expense of increasing the department which, as I have said, is already in existence in the inland Provinces.

In addition to the benefits rendered to agriculturists in buying and selling for them, the union performs a very important service to the agricultural community by providing an organization which can investigate discoveries which are likely to be for the advantage of the industry. A good many of such have been considered by the different committees during the year, and I propose now to give the results.

Some months ago the holder of the licences for the phosphate-bearing area in the neighbourhood of Weenen approached the union with the object of floating a company to develop the deposit. You are aware that some years ago a good deal of attention was given to this subject, but the result of trials then proved unsatisfactory. It was represented to us, however, that new reefs had been discovered, and the promoter was so confident of the high quality of the phosphatic rock that he offered to supply any proof which we might require. As all the soils in South Africa are deficient in phosphates, it is obvious that a very important aid to profitable cultivation would be supplied if a cheap local supply of this important fertilizer could be obtained. Recognizing this, we were anxious to render any assistance we could to prove the deposit. At our request the promoter obtained the services of Mr. Vipont, the Chief Government Chemist, to make a thorough examination, and, after analysis of the deposit, to make a report. Mr. C. H. Mitchell, one of the members of the executive committee, and I visited Weenen with Mr. Vipont to satisfy ourselves as to the quantity of the rock and the facilities for working it. These were found satisfactory, but I regret to state that the Government Chemist's report leaves no room for doubt that although phosphates are present in all the samples taken, in no case is the percentage high enough to enable the rock to be profitably treated with sulphuric acid for the manufacture of superphosphate. As the report has been published in the *Union Agricultural Journal* most of you have no doubt seen it, so I do not need to refer further to it. The only satisfactory feature in connection with the investigation is that it may be taken as finally settled that none of the deposits so far discovered are sufficiently rich to be profitably worked. It is to be hoped that further prospecting may yet bring to light higher grade rock.

Another proposal which was brought to us was a patent for drying wattle bark by hot air. A miniature plant was erected at Hill Crest, and many experiments were made. The results, though satisfactory so far as the analysis of the bark is concerned, were not convincing that the proper

method has yet been discovered of artificially drying bark of good colour. Many of you have had experience of the loss and expense in attempting to cure bark in broken weather, and all of you must realize the advantage to the industry if a simple cheap method of artificially drying bark could be discovered. I hope that further experiments will give more satisfactory results.

Another matter of interest to the wattle industry has been frequently before the wattle committee during the year. I refer to the preparation of wattle extract from the bark. For some time negotiations were carried on with an English firm, and hopes were entertained that a factory would be established in the vicinity of Maritzburg. I regret to state that this firm has decided not to embark on the enterprise. Others, however, have been making experiments, and I am in hopes of seeing an extract factory established in the near future. When the time arrives to commence operations, I trust members will assist by supplying part of their output to the factory. As the tanners who use extract are greater in number than those who use bark the effect of part of our bark being shipped in the form of extract would be to enormously increase our market. In this connection I may say that at a meeting of wattle growers held a few months ago a resolution was passed asking the Government to have experiments made by a chemist having experience of the leather trade, in order to determine the most effective method of preparing extract. The Government has acceded to our request, and has instructed Mr. Williams, the chemist at Cedara, to investigate the subject.

Some months ago two Johannesburg gentlemen approached the union for assistance in developing and putting on the market machines for compressing and binding together thin wattle poles, with a view to making mine props. From the information put before us the results appeared satisfactory, and steps were taken to form a small developing syndicate under the auspices of the wattle committee. Difficulties, however, were raised as to the validity of patents, and as we had no desire to be involved in a law suit the provisional agreement was cancelled. Since then the promoters, entirely apart from the union, have issued a prospectus with a view to manufacturing "Unity" poles. It seems uncertain whether any one in particular has the exclusive right to the idea, but in any case it is almost certain that the wattle industry will benefit from the new development, particularly if more than one company is engaged in the business.

During the year, when the new mail contract was concluded, it was intimated that the new rates provided for an alteration in the freight for wattle bark from 27s. 3d. per 2240 lb. weight, plus 10 per cent. primage, to 13s. per ton of 40 cubic feet measurement, plus 10 per cent. At first the union was supported by the Shippers' Association in its protest against the change, but later on the shippers altered their position and pressed for the bringing into operation of the new rates. Though the shipping company made a further concession by dropping the charge for primage, the union, with the support generally of growers, decline to agree to the change pending further investigations as to the cost of compressing the bark and also as to how the tanners would take the change. We have sent samples of the new method of packing to the tanners in England, Germany, and Australia, and so far as we have yet heard the alteration of the form of packing is looked upon with marked disfavour by the tanners. As the saving in freight would be considerable, I hope that arrangements may yet be made to adopt compressed bales. Meantime the Government has

undertaken not to bring into operation the new rates till such time as the growers are thoroughly satisfied as to the advantage of the change.

The question of grading wattle bark before shipment has received a good deal of consideration during the year. Though there are difficulties in the way of standardizing such a variable substance as wattle bark, the present position is found to be intolerable, and after much deliberation the wattle committee passed a resolution requesting the Government to arrange for the optional grading of bark. This decision was subsequently confirmed at a meeting of wattle growers, and, though the shippers consider the proposal impracticable, I trust the Government will give effect to the wishes of the industry. At present bark is usually sold as f.a.q. (fair average quality), and as there are no standards it rests entirely with the buyer to decide as to whether he will accept the shipment on its arrival. When a fall in prices takes place arbitration is usually claimed and allowance made against the seller. This position is unbearable, and it surprises me that those interested in the industry have put up with it so long. I am aware, of course, that a few of the old hands have themselves for years graded their bark and sold to customers, and naturally see no reason to change. The industry as a whole, however, requires protection from buyers who, in some cases at least, are not too scrupulous. A resolution was passed by the United Tanners' Association of England in favour of grading, and as will have been seen from the report of the Union Trades Commissioner in England, who has made a thorough investigation into the matter, both in Germany and England. he also strongly advocates Government grading. I hope, therefore, that the Government will introduce the system without delay. No conditions can be worse than the present.

Owing to increased production of bark the necessity for a wider market has arisen, and last year the union contributed towards the expense of a traveller proceeding to America and Canada to open up new outlets. A report full of information was obtained, but the effect of it was somewhat discouraging, as the opinion was expressed that extract only would be acceptable in these countries. Subsequent information, however, has led to a belief that it is possible to profitably introduce bark to the American market, and arrangements are being made for a considerable shipment as a trial. The union invited the co-operation in this venture of growers who are not members, and as a result two or three companies which have not so far seen their way to become members have given monetary contributions towards the loss on the shipment. The importance to the industry of this experiment cannot be well overrated. Should an entry be gained to America not only will the market be enormously increased, but much needed independent competitors will be obtained. At the outset we have had a good deal of discouragement, as the steamers which sail direct to America have secured full freight further up the coast, and we have been unable so far to get the shipping company to guarantee space even for a few months ahead. It is to be hoped that the delay will not result in the cancellation of the order which has been received.

Experiments have also been made in the extraction of wood spirit, acetate, and acetone from wattle wood, and the results point to a very important industry being opened up in the manufacture of these valuable chemicals.

A good deal of pessimism has of late developed as to the future of the wattle industry, and, strange to say, this feeling has been more pronounced amongst those who are not connected with the business than with those who are actively engaged in it.

As far as I can gather those who have for long been interested in the industry have no fears for its future. It is true that of late prices have been low, but we all know that fluctuations take place in the price of all commodities. Low prices have rendered an important service by inducing many tanners to try wattle bark who would otherwise have rested content with the use of oak bark, chestnut, quebrancho and other tanning materials. Though the output of bark is steadily increasing I have no doubt that the active, energetic men who are interested in the industry will discover means of increasing the consumption either by opening up new markets, or the manufacture of extract, or both. In addition we have the knowledge that the scarcity of wood in South Africa is causing a constantly increasing demand for timber for mine props and other purposes at remunerative rates. For myself I may say that I by no means share the pessimism as to the future of the industry.

Before sitting down I would like to pay a tribute to the hard work performed by the staff during the year. Owing to the constant increase of business we have always been shorthanded, with the result that the officials have had far too frequently to be working late at night. In particular I would like to bear testimony to the great services rendered to the union by Mr. Duff. His business acumen, energy, and enthusiasm have been invaluable.

In conclusion, I would like members to realize what a splendid work they are taking part in. If this could only be brought home to you I feel sure that we should have the active assistance of every one of you in bringing the advantages of the union to the notice of all those who have not yet joined. Union is strength, and I feel sure that we have an organization which will, ere long, embrace almost every member of the agricultural community to whom Durban is the natural port. To secure this end personal help is needed. I want every man here, when he goes back to his district, to be a missionary for this cause. It is by personal interest and by convincing men who are inclined to hold aloof that you can do the most beneficial work. I claim the active co-operation of every one of you.

Mr. John Moon seconded the motion, and said he was sure they, as farmers, could do nothing but congratulate the president, the committee, and the secretary and his staff on the excellent work they had done in the past year. The union started in a small way, as they all knew, and they could shake hands with themselves on the success achieved, considering the vast sums of money which had passed through the union's hands. The results of the organization showed that South African farmers were really progressive. It was said, when the union was started, that they were making a big mistake. This was said by the merchants, who asserted that farmers should mind their own business, and leave the merchants to mind theirs. But for the union, however, farmers would have had to pay higher prices for manures and grain bags than they had years ago. Farmers did not lack respect for the merchants, and wanted them to live, but agriculturists also wanted to exist. In the past the merchants in the towns had had a big pull on the farmers, more especially with regard to implements. From 50 to 60 per cent. had been made out of implements in the past, and that was too much. No farmer he knew of had made the progress financially that merchants had made. No farmer had the banking accounts, the motor cars and the mansions that the merchants of the Province enjoyed. Some farmers had motor cars—and quite right, too—but they were little ones. (Laughter and applause.

# The Durban Show.

On the 1st, 2nd, 3rd, and 4th July the Durban and Coast Society of Agriculture and Industry held their Thirteenth Annual Show in their spacious grounds in most favourable weather conditions. Unfortunately, His Excellency the Governor, Lord Gladstone, who was to have opened the show, had to leave for Pretoria on urgent State business on the morning of the opening, which caused great disappointment. However, Lady Gladstone most ably performed the function, and in the course of her address Her Excellency read the following message from the Governor-General :—

"The success of the show, I am told, is assured. Judging from the experience of the last two years, of that I can feel no doubt. I wish to urge upon the farmers the need for continued precautions against East Coast fever. Restrictions may be irksome, but we must face the fact that, while on 30th June, 1911, there were no less than 1500 centres of infection in Natal, at the present time there are still 610. No doubt this number will be rapidly reduced, but the infected areas are scattered all over the Province, and there is scarcely a division which is entirely free from the disease. Much trouble has been caused by the absence of compulsory dipping powers on private lands where the natives have established kraals, but the Government is now doing its utmost, having got the necessary powers, to enforce dipping. I am confident that farmers, even at some present loss to themselves, will recognize the imperative necessity for total eradication of the disease. In view of the fact that farmers to a large extent have restarted their stock with superior animals, and that under the mail contract not far short of 1000 pedigree animals have been imported into South Africa, the need of continued precaution is very great. I wish every success to the show." Concluding her address, Her Excellency said :—"The future of South Africa is in the farmers' hands. The first necessity of life is food, and here in South Africa there are vast tracts of land only waiting for irrigation or dry farming, or whatever the best methods may prove to be. We look at what has already been done, and in that see the best possible hope for the future, and this Durban show marks another milestone on the road which is leading you to still further success and prosperity."

### Horses.

The horse section of the show, on the whole, was excellent, especially in regard to the more important classes of Thoroughbreds and Hackneys. In the former, comprising eight classes, there were some 68 entries. Messrs. Anderson Brothers, Bethlehem, Orange Free State, won the first prize in the class for stallions, three years and over, with their beautiful horse Chesney, which also took the champion silver cup, presented by His Excellency Lord Gladstone for the champion (male) of all horses or colts in classes one to four. Mr. J. Campbell, Durban, secured a first prize with his South African bred stallion Minto. In the class for stallions, three years and over, standing at a stud fee of not more than £5. 5s., Wilkins Micawber, of the Government Stud Farm at Tweespruit, Orange Free State, was first, and The Phœnician, of the Government Stud Farm at Standerton, second. Other first prizes awarded for Thoroughbreds included Mr. Gervais Jones' Flittermouse (colts, two years); Mr. Arthur Forbes' Tactician (colts, yearling); Mr. G. W. Nourse's Indigena (mares, three

*Plate No. XXI.* HEACHAM RIPPER. [*Photo by R. G. Koehler*

Mr. Arthur Forbes' (Temple Farm, Schoombie) Hackney Stallion. First Prize winner at Maritzburg in Hackney Stallion and Single Carriage Horse Classes and winner of the silver medal of Hackney Horse Society for Best Imported Hackney Stallion; and awarded 100-guinea cup and championship at Durban. Sire, Heacham Gabriel; dam, Lady Win.

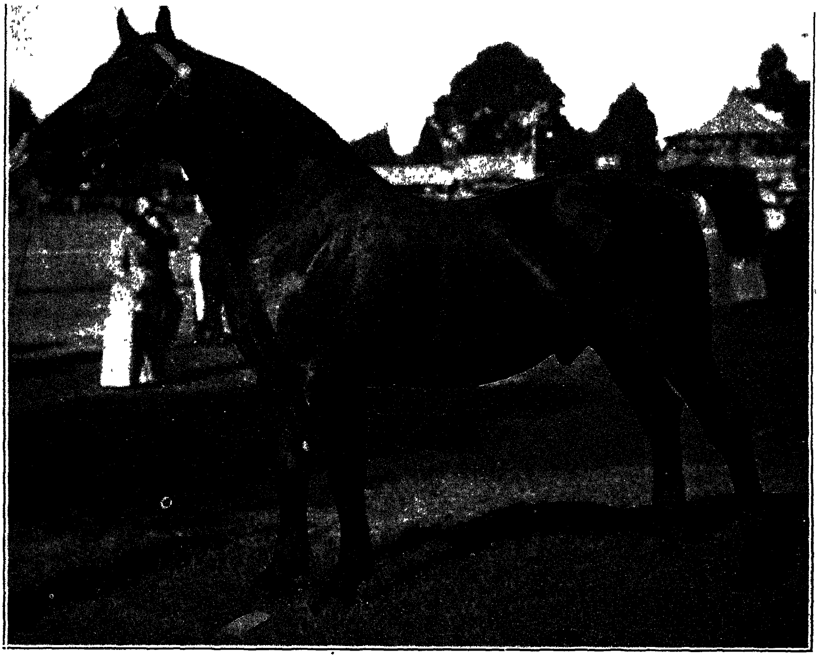

*Plate No XXII.* **POTENTAT (2299).** *[Photo by R. G. Koehler.*

Oldenburg Stallion, belonging to Mr. Andrew Kiddie, Jones Street, Kimberley: winner of Special Prize at Maritzburg and First and Championship at Durban (classes 24–32).

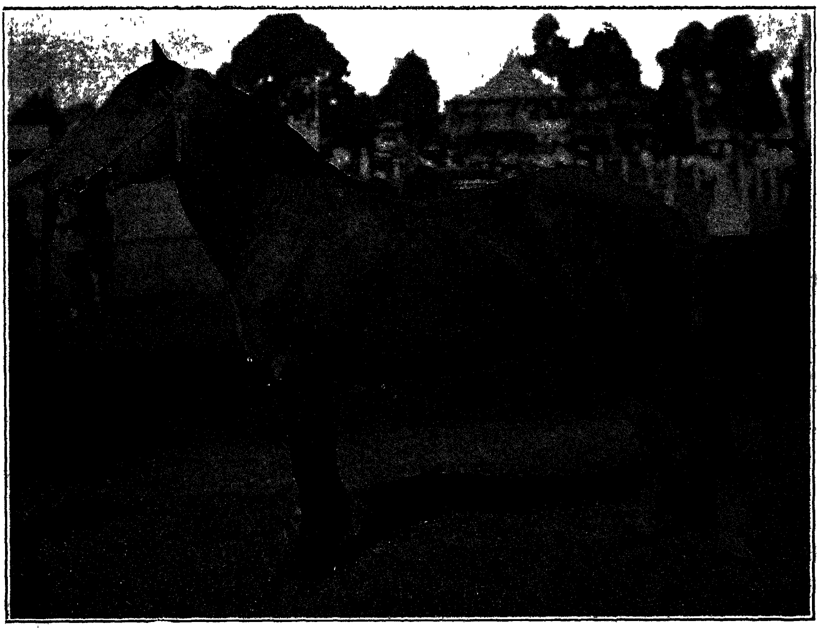

*Plate No. XXIII.* **GLEN BONNIE (602).** *[Photo by R. G. Koehler.*

Mr. W. Kiddie's Highland Pony Stallion; First Prize winner at Durban in Class for Pony Stallions, 13·2 and under. Sire, Bonnie Laddie (329); dam, Nell II (205).

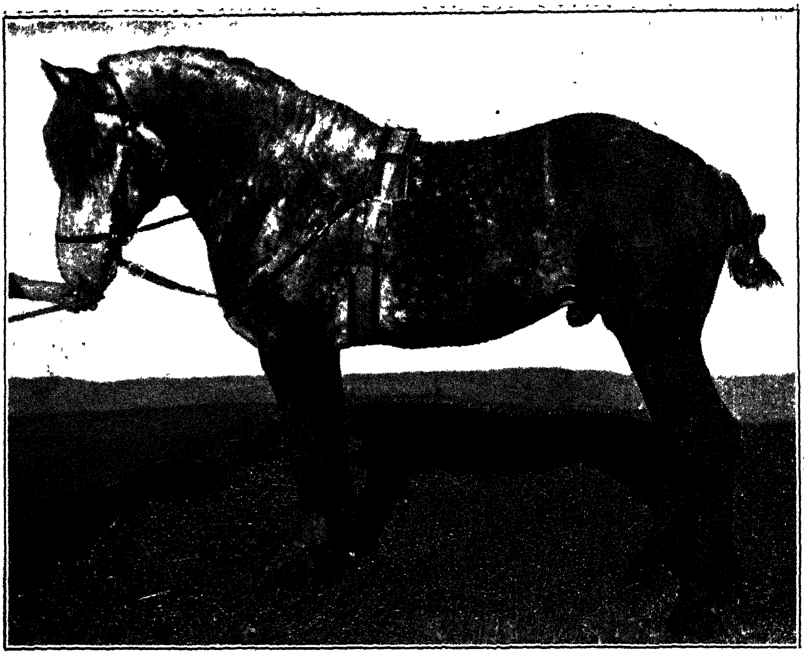

*Plate No. XXIV.* HECTOMETER. [*Photo by R. G. Koehle*

First Prize winner at Maritzburg in class for Light Draught Stallions, 3 years and over, imported or otherwise. Exhibited by Sir Duncan McKenzie, Cotswold, Nottingham, Natal. (First time shown)

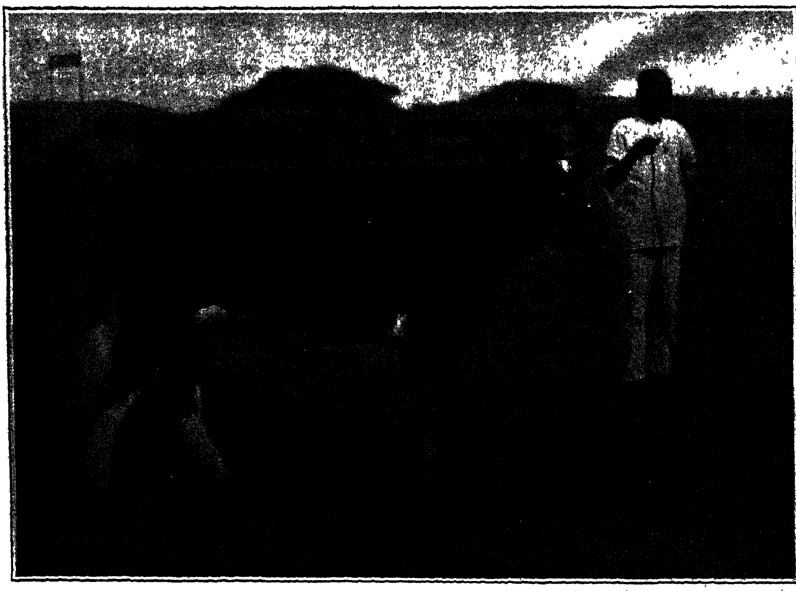

*Plate No. XXV.* BUTTERSCOTCH XIV. [*Photo by R. G. Koehler*

South-African Bred Shorthorn Heifer, belonging to Mr. P. D. Simmons, Mooi River, Natal; First Prize winner at Durban and Reserve Champion for Shorthorn Society's special prize.

years and over); Mr. Nourse's Splendour (fillies, two years); Mr. Otto Norton's Broxton Belle (fillies, yearling); and Mr. Forbes' Glad Eye (colt or filly foals). The prize presented by Natal Tattersalls for champion among mares or fillies in classes five to eight was awarded to Mr. G. W. Nourse's Indigena.

As regards the Hackney section, great interest was evinced in the first championship competition of the Hackney Horse Society for South Africa. The principal breeders naturally had sent the pick of their animals to Durban, with the result that the competition in classes other than for the championship was also very keen. The championship cup (value 100 guineas) was won by Heacham Ripper belonging to Mr. Arthur Forbes, Temple Stud Farm, Schoombie, Cape Province, which horse also won the single harness championship (stallions). The "first" awards in Hackney classes included Mr. J. P. Fourie's Thornthorpe Viceroyalty (stallions, three years and over); Mr. W. K. Anderson's Royal (yearling colts); Messrs. Matthews & Watson's Arcadia (mares, three years and over); Messrs. Matthews & Watson's Honeymoon (fillies, two years); Mr. Forbes' Temple Empress (yearling fillies); and Mr. Forbes' Temple Win (colt or filly foals).

In the harness classes, Mr. Forbes' Heacham Ripper was awarded the championship for stallions, and Messrs. Matthews & Watson's Arcadia for mares.

### CATTLE.

It is a long time since such a good show of cattle was seen in Durban. Among the Shorthorns the challenge cup of the Shorthorn Society of South Africa (value £25) went to the heifer Eirwal Ruth of Mr. C. Groom, Weenen, whilst Mr. P. D. Simmons, of Mooi River, Natal, obtained the reserve championship with his heifer Butterscotch XIV. The latter gentleman's massive bull Barrington won the first prize in the class for Shorthorn bulls, three years and over. Other first prize-winners in Shorthorns were Mr. P. B. Stevenson's Farmer Giles (bulls, two years); Mr. C. Groom's Wild Rose (cows, three years and over); Mr. Groom's Eirwal Ruth (heifers, two years); Mr. P. D. Simmon's Butterscotch (yearling heifers); and Mr. P. B. Stevenson's Carshalton (calves, bull or heifer).

The Devons, although not forming a very large section, were much better than last year. Col. E. M. Greene, of Estcourt, won the first prize in the class for bulls three years and over with his splendid animal Golden Gift, whilst Mr. J. W. Johnston, of Weenen, secured first in the corresponding class for South African bred bulls with his Beefsteak. For cows, three years and over, Col. Greene obtained first for his Ruby, whilst Mr. T. W. J. Hall, of Weenen, secured firsts for his heifers Quibel and Imangas.

In the Friesland classes there was keen competition, especially among the females. The breeder's cup for the best Friesland family bred in South Africa, excepting the bull, and consisting of bull, cow three years and over, two-year-old heifer, yearling heifer and calf (either bull or heifer), went to Mr. Edward Downing, of Weenen, whilst the Otto Estate, of Otto's Bluff, was second in this competition. Mr. F. Harris, of Maritzburg, secured the champion prize with his splendid cow Kempshott Wiegerle XIV, and the reserve champion was Mr. Edward Downing's heifer Sheltered Vale Jonquil II. The other first and second prizes in the Friesland classes were divided amongst Mr. Edward Downing and Otto's Estate.

In the other classes for pure-bred animals there were not many entries, but the Ayrshire yearling bull Warrit Handsome, belonging to Mr. R. E. Hooper, of Nottingham Road, deserves special mention.

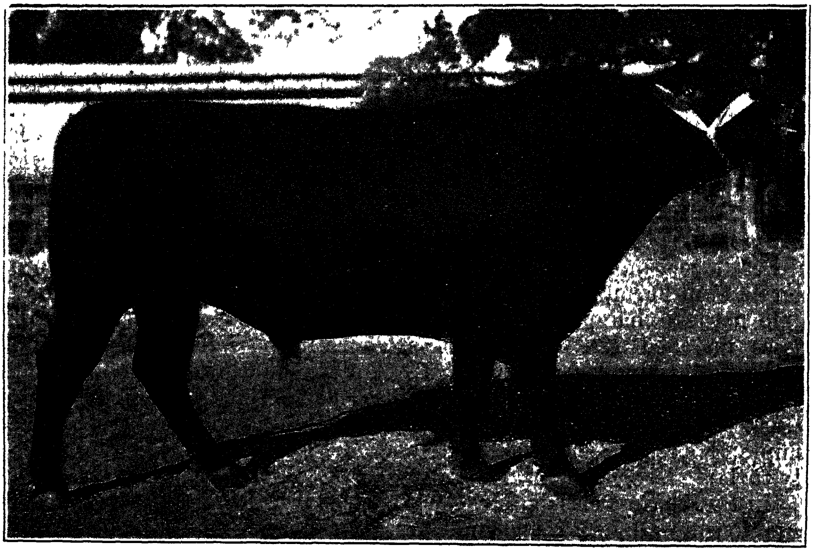

*Plate No. XXVI.* GOLDEN GIFT (3161). [*Photo by R. G. Koehler*

Col. E. M. Greene's (Nottingham Road) Devon Bull; First at Maritzburg and Durban. Sire, Golden King (2621); dam, Daisy VI (4508).

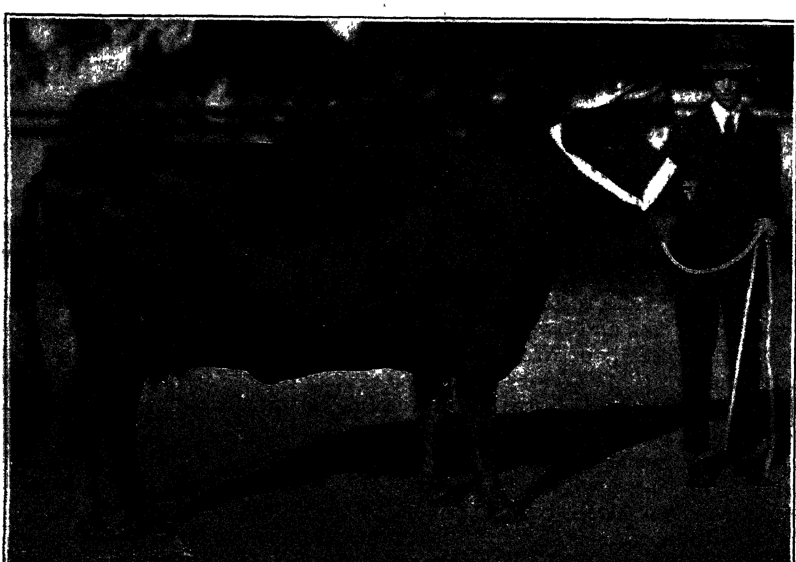

*Plate No. XXVII.* RUBY V (4701). [*Photo by R. G. Koehler*

Devon Cow owned by Col. E. M. Greene, Nottingham Road, Natal; First Prize winner at Maritzburg and Durban. Sire, Prince Edward (6517); dam, Ruby II (2374).

*Plate No. XXVIII.* THREE FINE FRIESLAND HEIFERS. [*Photo by R. G. Koehler*

First Prize winners at Maritzburg Show. The property of Mr. E. E. Downing, "Sheltered Vale," Rosetta, Natal.

*Plate No. XXIX.* ELAND AT THE MARITZBURG SHOW. [*Photo by R. G. Koehler.*

A special exhibit of Eland (bull, cow, and calf) shown by Messrs. Moe Bros., New Hanover, Natal.

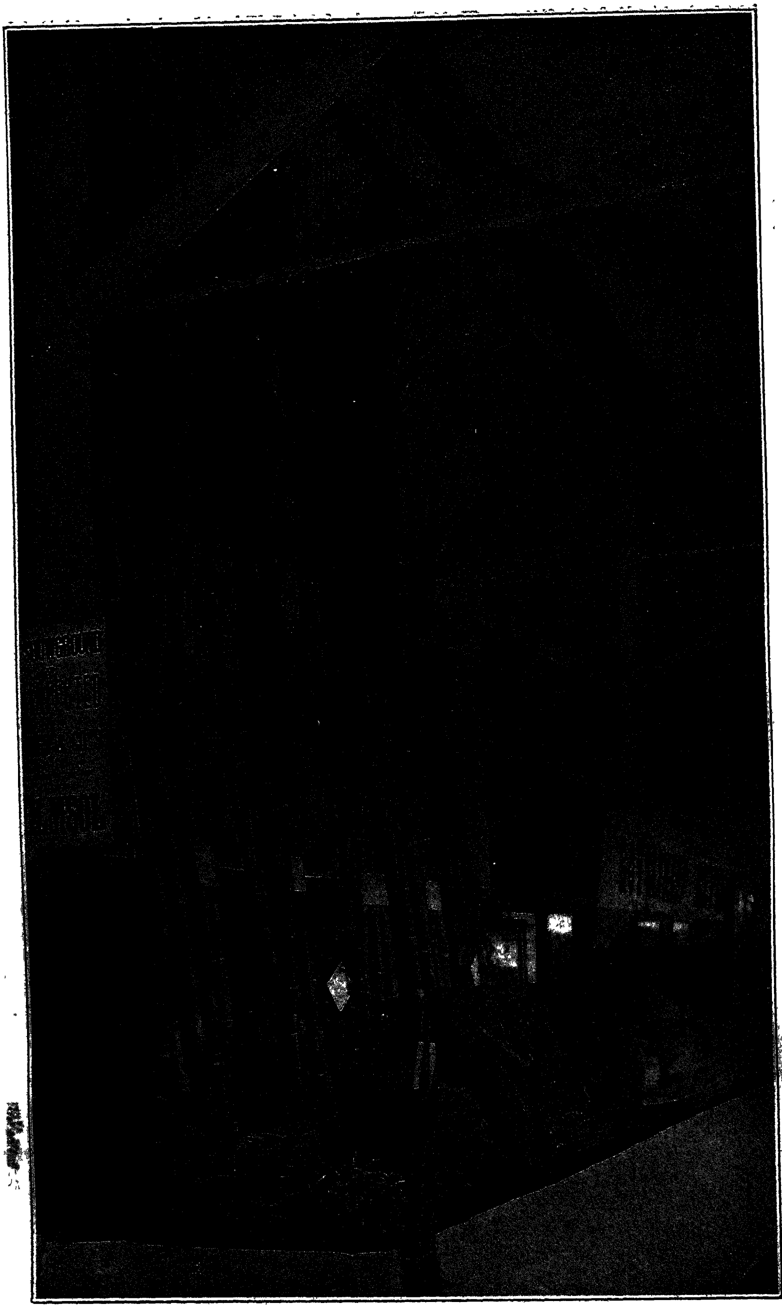

*Plate No. XXX.* [*Photo by R. G. Koehler.*

AMONG THE GOVERNMENT EXHIBITS AT DURBAN.

Different varieties of Sugar-cane grown at the Government Experiment Station, Weenen, Natal.

There were many entries in the open class for dairy cows, and the following prizes were awarded:—Dairy cow giving greatest quantity of milk, Charlie Henwood's Lady Bell 1, E. E. Downing 2. Cow giving the greatest quantity of butter-fat in class 154, Charlie Henwood's Lady Bell 1, E. E. Downing 2. Cow, pure or grade, giving highest percentage of butter-fat, Charlie Henwood 1, E. E. Downing 2. Dairy cow, any breed or grade, Geo. Swale's Dickbird 1, E. E. Downing's Clintonia Fan 2.

## SHEEP.

The sheep section included all the well-known breeds of South Africa. The Merino types were the strongest section, but the classes for Wanganellas, Rambouillets, and mixed types were rather weak; although competition was good, most of the animals lacked in quality. The Shropshires, however, were excellent. In the Merino classes, Messrs. A. and V. Robertson secured "firsts" in the following classes:—Rams, two-tooth and over; ram lambs; ewes, two-tooth and over; ewe lambs; and among the robust-woolled, in the classes for rams, two-tooth and over; ram lambs; ewes, two-tooth and over; ewe lambs; ram and ewe lambs (South African bred) and ram (lambs to be the progeny of the ram). Other first prizewinners in the Merino classes were Messrs. P. D. Simmons (rams, two-tooth and over), and Mr. E. E. Downing (ram lambs), ewes (two-tooth and over), ewe lambs, and championships for classes 172 to 181. First prizes in the Shropshire Down classes were taken by Messrs. R. Garland (rams, two-tooth and over), ram and ewe lambs (South African bred), and ram lambs (to be the progeny of the ram); and W. E. Clarke & Co. ram lambs, ewes (two-tooth and over), and ewe lambs. Among the Persians, the first prize-winners were Messrs. Walter Pepworth (rams, South African bred ram lambs and South African bred ewe lambs), and B. J. Human (ewes). The long-wool "firsts" were secured by Messrs. A. A. Hamilton (rams, two-tooth and over, and ewes, two-tooth and over), and J. W. Johnston (ram and ewe lambs, South African bred).

There were also some excellent exhibits of poultry, and the other sections—produce, dairy, fruit, machinery—were all better than last year. Throughout the four days that the show lasted, there were crowds of visitors, who thoroughly appreciated the excellent arrangements, upon which the society and its secretary, Mr. John Morley, to whose hard work much of the great success of the show was due, are to be congratulated.

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## SOUTH AFRICAN MAIZE SHOW.

One of the features of this year's show at Durban was the magnificent exhibition of maize. Although the show of maize at Durban has always been a good one, all previous records were easily broken by this, the first of a regular series of truly South African maize exhibitions. The present year's show was a distinct success; and some idea of the keen competition may be gained from the fact that the judges and stewards (a photo of whom appears in this issue) were kept constantly busy for more than two days. This annual show should do a great deal to encourage, not only the maintenance of our present excellent standard of grain, but also a friendly rivalry which will go far towards raising that standard and increasing the number of growers of good maize.

As will have been gathered, there was a very large number of entries. The championship for seed maize went to Mr. W. S. Macpherson, of Barberton (Transvaal), whilst Mr. J. W. Flett, of Richmond, obtained first, and Mr. W. F. Marais, of Haverklip (Transvaal), second, for the best exhibit,

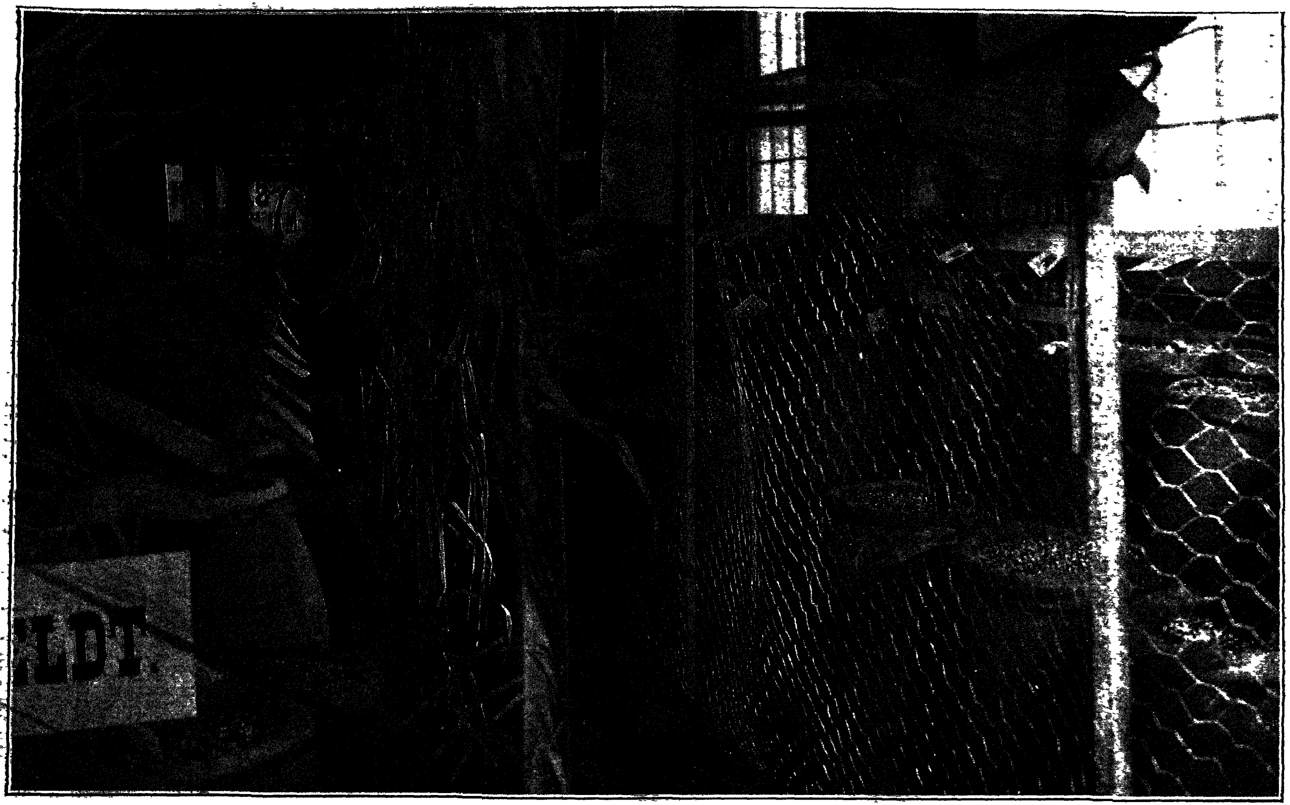
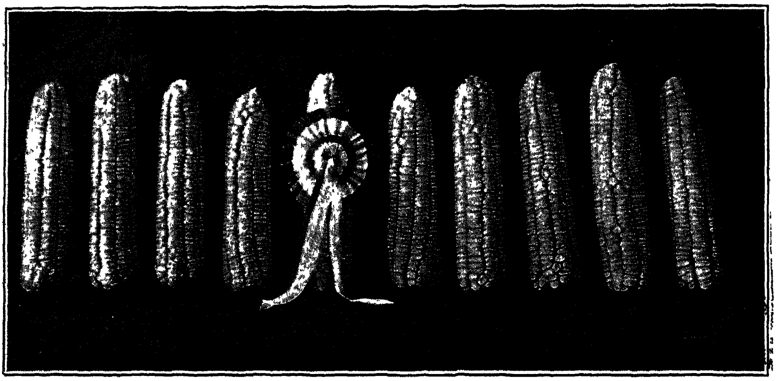



*Plate No. XXXI.* A CORNER OF THE MAIZE SHOW. [*Photo by R. G. Koehler.*

*Plate No. XXXII.* GROUPS OF JUDGES AND STEWARDS [*Photo by R. G. Koehler.*

who were entrusted with the duty of awarding the prizes in the Maize Show. The show was the best ever held in Durban; there were no less than 240 entries, and it took the judges over two days to complete their labours.

of Hickory King. For the best ten ears of Hickory ten-row Mr. W. G. Macpherson was again first and Mr. W. B. Bosse, of Maritzburg, second. The first prize for the best three muids of shelled Hickory King and one bag of ears went to Mr. W. T. Quested, of Klipriver; and Mr. John Marwick,



[Photo by R. G. Koehler.

CHAMPION MAIZE AT DURBAN SHOW.

Two championships were competed for: one for the best 100 lb. of shelled grain and ten cobs of Hickory King; and the other for the best of any other breed. The former was awarded to Mr. J. W. Flett, Richmond (whose cobs are shown above).

of Richmond, obtained second. Mr. Walter Pepworth, of Maritzburg, secured first for the best three muids of Yellow maize for stock feeding, while Mr. W. F. Marais was second. The championship for shelled maize went to Mr. J. W. Flett, while Messrs. John Fowler & Co., Vereeniging, secured the first prize for Mercer and for Louisiana ten-row.

# Rural Notes.

### Next Sale of Pure-bred Stock.

It is anticipated that the next sale of pure-bred stock, the property of Government, will be held in October or November at the Ermelo and Potchefstroom farms in the Transvaal, and at the Tweespruit farm in the Orange Free State. Those interested in the matter should be on the look-out for the usual advertisements; and in due course full particulars will be obtainable from the managers of the farms in question.

### Veterinary Surgeon Required.

The services of a qualified veterinary surgeon are wanted at once for the Bechuanaland Protectorate until 31st March, 1914. Salary at the rate of £400 per annum is offered, together with travelling allowance and free transport. Applications should be made to the Government Veterinary Officer, Mafeking.

### International Dry Congress.

The Department of Agriculture has received from Mr. John T. Burns, Executive Secretary-Treasurer of the International Dry-Farming Congress, U.S.A., a notification of the forthcoming International Dry-Farming Congress and Soil Products Exposition, to be held in Tulsa, Oklahoma, U.S.A., during the ten days commencing 22nd October next. In connection with this Congress the Department of Agriculture intimates that should any one from this country interested therein be travelling in the United States at the time, the Government will be pleased to furnish such persons with letters of introduction to the authorities of the Congress. Should any one be desirous of availing himself of these facilities, he should make application to the Secretary for Agriculture, P.O. Box 434, Pretoria.

### Potchefstroom Short Course.

The announcement that a short course for young farmers would be held at the School of Agriculture, Potchefstroom, during July, when the regular students are on holiday, was met with a ready response. Over seventy men were booked for the course, but owing to the strike and other unforeseen causes, a number fell out, and sixty-two students were enrolled. Representatives were present from all four Provinces of the Union. Lectures began on 17th July and closed on 1st August. The men were kept busy with lectures in the morning and demonstrations in the afternoon, with frequently special addresses in the evenings. The instruction has been made as practical as possible, live stock and grain judging, veterinary demonstrations, butter-making and milk testing, the operation of machinery, grafting, pruning, and poultry work receiving special attention. It has been very gratifying to the management of the school to note the keen interest manifested by all students in the work of the course. The majority in attendance are already farming for themselves; they are busy men, yet they consider the four weeks given to the course at Potchefstroom as well spent. They return at once to their

farms and the work of the short course has thus a direct influence on the progress of agriculture in the country. Mr. J. A. Neser, M.L.A., Klerksdorp, favoured the school with an address on the evening of the 23rd inst. Mr. Neser took for his subject "Dry-Farming," and gave a most interesting and instructive discourse. We shall not be surprised to hear that many converts have been made to the dry-farming system as a result of his visit. Mr. W. H. Scherffius, Chief, Tobacco and Cotton Division; Mr. Stephens, of the Forestry Department; Mr. A. M. Spies, Sheep and Wool Division; and Mr. J. J. Morton, Manager, Stud Farm, Tweespruit, have assisted the school staff with special lectures in their respective departments. Mr. Harry Holcroft, advocate, Potchefstroom, addressed the students on the evening of the 28th July, and explained the more important laws relating to farming. Senator Byron, Westminster, delivered a special address to the staff and students on Thursday evening, the 21st. The course closed on 1st August.

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**Vacation Courses at Elsenburg.**

From the 16th to the 28th June, 1913, a vacation course was held at Elsenburg on horticulture and viticulture. The course was attended by six farmers and farmers' sons. The small number of attendants was due to the length of the course (most farmers not being able to get away from their farms for more than a week at a time) and to the fact that it was unavoidably advertised rather late. The first course included the "Establishment of the Orchard," "Maintenance of the Orchard," "History and Methods of Caprification of Figs" (lectures given by Mr. I. Tribolet, Horticulturist at Elsenburg), and "Insect Pests and Fungoid Diseases in the Orchard" (lectures given by Mr. H. O. S. Reinecke, Assistant Horticulturist at Elsenburg). The course of viticulture included the "Establishment and Cultivation of a Vineyard" (lecture by Mr. S. W. van Niekerk, Viticulturist at Elsenburg), "American Stocks and the principal varieties of Table and Wine Grapes" (lectures by Dr. A. I. Perold, Government Viticulturist), "Manuring of Vines" and "Vine Diseases" (lectures given by Mr. W. Wagener, Assistant Government Viticulturist. In connection with the foregoing lectures practical demonstrations were also given. Those taking part in the course were very much interested in the work, and well satisfied with the time thus spent.

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From the 30th June up to the 12th July a course was held on agriculture and stock, poultry, dairying, agricultural chemistry, agricultural botany, silos and byre construction. In this course seventeen ladies and gentlemen took part. During the first week of the course, lectures and demonstrations were given on poultry and dairying by Messrs. W. O. John and Jas. Gow, respectively Lecturers in Poultry and Dairying at Elsenburg. The course in poultry included the laying out of a poultry farm, construction of houses and runs, the best breed of fowls and layers, the best breeds for eggs and table; ducks, geese, turkeys, etc.; feeds and feeding; incubators and brooders—their construction, handling, and uses; killing and trussing of poultry for home markets; testing, grading, and packing of eggs; poultry diseases, their causes and cures. The course in dairying included lectures on milk—its composition and secretion, care and cooling of milk, pasteurizing, milk testing, and the use of milk records; cream—its composition, separation and separators, cream for butter-making, cream ripening and the care and use of pure culture starters, cream cheese;

butter—the churning, washing, brining, salting, and working of butter. Practical demonstrations were given. During the last week of the course lectures and demonstrations were given on agriculture and stock and agricultural chemistry by Messrs. D. C. Crawford and P. Fowlie, respectively Lecturers in Chemistry and Agriculture and Stock. The lectures in agriculture included soils, manures, and crops. Those in stock included foods and feeding, principle of breeding, farm and stock. Lectures in plant-breeding were given by Mr. J. H. Neethling, the Plant-Breeder at Elsenburg. Mr. N. W. Chandler, Lecturer in Engineering, gave certain lectures on silos and byre construction. Generally a keen interest was taken in all the work, and it is felt that these vacation courses fulfil a real need.

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**Sheep-dipping Orders.**

The following order by the Minister of Agriculture has been gazetted:—Under and by virtue of the powers and authorities in me vested by paragraph (*f*) of section *sixteen* of the Diseases of Stock Act, 1911, I do hereby order that any owner of sheep or goats in the Districts Calvinia, Van Rhynsdorp, Namaqualand, and Sutherland, in the Province of the Cape, shall cause all his sheep and goats to be dipped under the supervision of an inspector or other officer duly authorized thereto in the manner prescribed by regulation at the time herein set forth. In Calvinia the time shall be from 1st August, 1913, to 30th September, 1913; in Van Rhynsdorp and Namaqualand from 1st September, 1913, to 31st October, 1913; and in Sutherland from 1st October, 1913, to 30th November, 1913. During the periods stipulated every owner of sheep or goats in any of the districts named shall dip all his sheep or goats once, and shall dip them a second time within a period of not less than ten days or more than fourteen days after the date of the first dipping, provided that if the sheep or goats of any owner have been free from scab for a period of twelve months immediately preceding the dates given above for the commencement of dipping in the different districts the local inspector may, by writing under his hand, exempt such owner from the provisions of this order. Any person in any of the above-mentioned districts who, on or before the first day of the simultaneous dipping period for the districts as stipulated above, receives written notice from an inspector or other officer of the department authorized thereto that it is the intention of the department to cause his sheep or goats to be dipped under supervision, shall not proceed with any dipping whatsoever prior to the arrival of such inspector or officer. Provided that in the case of scab breaking out such person shall cause such of his sheep or goats as are visibly infected to be dipped from day to day pending the arrival of the inspector or other officer.

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Every owner desirous of removing his sheep or goats after the two dippings have been completed in the manner prescribed by the said regulation, and before the expiry of the said period, shall obtain the required permission from the inspector immediately after the second dipping has been completed. During the said period as prescribed for each district no person shall remove any sheep or goats from any farm, location, reserve, commonage, or other place on which they may then be grazing or kept, except upon the authority of a permit issued by an inspector or other officer authorized thereto. Such permit may only be issued after such sheep or goats have been dipped the second time or (as

the case may be) have been exempted by the local inspector as aforesaid from dipping. During the said period no person shall, except upon a written permit from an inspector or other officer from the department authorized thereto, and by a route to be stated therein, move or cause or permit to be moved any sheep or goats on to any farm, location, commonage, or other place on which any dipping prescribed by this order is proceeding. Any person who contravenes, disobeys, or fails to comply with the terms of this order, or with any lawful order or requirement of an inspector or other officer authorized to perform any dipping, or with the condition of any permit or other document issued under the order, shall be guilty of an offence, and liable on conviction to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for a period not exceeding six months.

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**The Custard Apple.**

The accompanying illustration represents a specimen of the above fruit sent in to this office by Mr. S. W. Trollope, Wonderboom, Pretoria, Pretoria District. Although a fair size, it is not abnormal by any means, as fruits up to 21 lb. in weight are not altogether uncommon. The variety in question is unnamed and was grown from seed of a specimen brought to Durban from India, which country may be set down as the home of the fruit. The custard apple has a very wide range in South Africa; it is grown successfully in the warmer districts of the Transvaal, Natal and Cape Provinces, and may be found from Louis Trichardt in the north to the district of George on the south coast. Propagation is simple, as the tree grows readily from seed, but as in the case of most other fruits, it cannot be depended upon to reproduce itself "true from seed"; recourse therefore is had to grafting, and this is accomplished usually by much the same method as the Western Province farmer employs in grafting his grape vines, the scions are inserted in the stocks and the whole covered over with soil. It appears to be immaterial whether the grafting is done below, on a level with the surface or above the ground, as long as the scion is covered and kept fairly moist for the first week or two.

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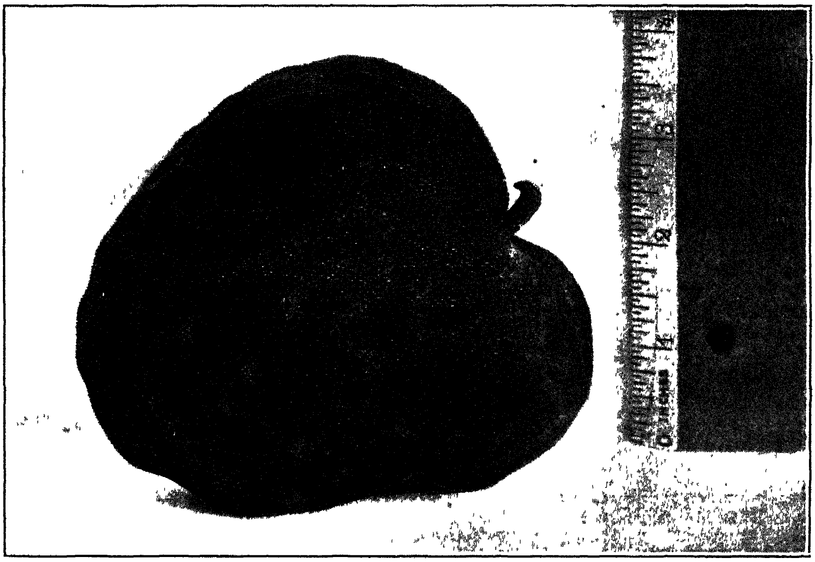
*Soil.*—From what may be gathered from Indian writers on the subject it would appear that the custard apple tree has a decided weakness for growing out of cracks and crannies on rocks, old walls, and other similar situations. Possibly in the wild state this may be the case, and so assuming the correctness of this statement one is unprepared to read that "a deep stony soil is generally suitable, but alluvial produces good specimens." From what the writer has seen in South Africa, both the best grown trees and the finest fruit are produced in the deep free loams such as may be found along the Magaliesberg Mountains in the Transvaal and in many other parts both of the Cape and Natal. It is necessary, however, for the tree to succeed that a frostless situation is selected in which to plant it, that plenty of room be allowed for the spread of its roots and branches, and that it receives such attention with the pruning shears and cultivator as is meted out to any other fruit tree when planted in orchard form. When single trees are grown in a garden it may be possible to afford them plenty of liquid cow manure, and to this particular dressing they seem to respond more readily than to any other. In the case of a small plantation

this system would be more difficult to carry out, but in case cow manure were obtainable it should certainly be used and a complete fertilizer applied biennially. The custard apple is supposed to be one of those fruits for which a taste must be acquired. One Indian writer states he has "never met a European who was partial to it"; from what one can see and hear in South Africa, there is no need to acquire a taste for it, the taste is here, but sufficient of the fruit to gratify it is absent. That this should be the case considering the ease with which the trees can be grown, would in an older country appear remarkable, but in South Africa it is not singular, when one considers the size of the country and the numerous other channels, even in fruit growing, which invite the attention and energy of our farmers. It must not be assumed, however, that nothing has been done in the production of this fruit; the trouble is that too little effort has



been made and insufficient notice taken of its possibilities. There is every reason why further planting should take place to supply our own markets. It is possible also that in time an export business will develop, as the custard apple is in a class by itself as a shipping fruit, and can be sent with success from South Africa to almost any part of the world.—R. A. DAVIS, Chief, Division of Horticulture.

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**Official Telegraphic Addresses.**

The old telegraphic addresses of the various Government farms and schools of agriculture have been revised and placed upon a uniform basis. It is sufficient now to remember that in each case the telegraphic address is "Landbouw," but in order to prevent any possible misunderstanding we

give here a list of the various institutions concerned, with their old and new addresses :—

| | Present Telegraphic Address. | New Telegraphic Address. |
| --- | --- | --- |
| School of Agriculture, Potchefstroom ... | Landbouw, Potchefstroom. | Landbouw, Potchefstroom. |
| " " Grootfontein ... ... | Princol, Middelburg, Cape | Landbouw, Middelburg, Cape. |
| " " Elsenburg ... ... | Ager, Mulders Vlei. | Landbouw, Mulders Vlei. |
| " " Cedara ... .. ... | Director, Cedara. | Landbouw, Cedara. |
| " " Glen ... ... ... | Agoric, Bloemfontein. | Landbouw, Glen. |
| Stud Farm, Standerton ... ... ... | Landbouw, Standerton. | Landbouw, Standerton. |
| Experiment Farm, Tweespruit ... ... | Manager, Exp. Farm, Tweespruit. | Landbouw, Tweespruit. |
| " " Grootvlei ... ... .. | Manager, Exp. Farm, Grootvlei. | Landbouw, Grootvlei. |
| Experiment Station, Robertson ... ... | None. | Landbouw, Robertson. |
| " " Malmesbury ... ... | None. | Landbouw, Malmesbury. |
| " " Weenen ... ... ... | Weenen Farm, Weenen. | Landbouw, Weenen. |
| " " Winklespruit ... ... | Farm, Winklespruit. | Landbouw, Winklespruit. |

The following telegraphic addresses have been discontinued, viz :— "Agoric" (Under-Secretary for Agriculture, Bloemfontein), and "Manager" (Farm Manager, Cedara).

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**Farms for Disposal.**

We give herewith a list of Government farms for disposal in the Rustenburg, Waterberg, and Zoutpansberg Districts of the Transvaal, on the terms referred to in the Editorial Notes in this issue. The title to be issued will contain conditions relative to residence, improvements, fencing, and such other conditions as are usually inserted in agricultural leases granted under the Land Settlement Act of 1912. The rent paid during the last period of five years is not deducted from the purchase price in the event of the option to purchase being exercised. All rights to minerals, mineral products, mineral oils, metals, and precious stones are reserved to the Crown. Applicants are recommended personally to inspect farms before formally applying therefor. Occupation can be granted immediately upon allotment. These holdings are suitable for agricultural and stock farming; and the following observations on the different lots, by the Lands Department, are published in the *Union Gazette* :—(1) Fairly well wooded; slightly malarious in wet seasons. There are two boreholes on the holding, one giving an estimated daily water supply of 60,000 gallons and the other 31,500 gallons. Natives living in the vicinity. About half the farm is arable if bush is cleared. (2) Fairly well wooded; slightly malarious in very wet seasons. There are two boreholes on the holding, one giving an estimated daily water supply of 33,000 gallons and the other 5800 gallons; natives living in the vicinity: about one-third of the farm is arable if bush

is cleared. (3) Fairly well wooded; slightly malarious in very wet seasons. There are two boreholes on the holding, one giving an estimated daily water supply of 12,000 gallons and the other 15,000 gallons; natives in the vicinity. Nearly the whole farm is arable if cleared of bush. (4) Fairly well wooded; slightly malarious in very wet seasons. There is a borehole on the holding giving an estimated daily water supply of 10,000 gallons; natives living in the vicinity. The greater portion of this farm is arable if cleared of bush. (5) Fairly well wooded; slightly malarious in very wet seasons. There are two boreholes on the holding, one giving an estimated daily water supply of 9936 gallons and the other 9504 gallons; natives living in the neighbourhood. About half the farm is arable if bush is cleared. (6) A large area of the holding is arable. There is a borehole on the holding giving an estimated daily water supply of 4320 gallons; healthy; natives living in the vicinity.

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Farm No. 7: Healthy; native labour scarce. There is a borehole on the holding giving an estimated daily water supply of 72,000 gallons. (8) Well timbered; no permanent water supply; considered healthy; natives plentiful in vicinity. An amount of £32. 0s. 7d. has been added to the valuation of the holding in respect of fencing. (9 and 10) Bush; malarious; natives living in the vicinity. (9) A borehole has been sunk on this holding, giving an estimated daily water supply of 50,000 gallons. (10) A borehole has been sunk on this holding, giving an estimated daily water supply of 22,000 gallons. (11) Well wooded; a tributary of the Zand River runs through the holding. There is a small wattle and daub house on the holding in bad repair. (12) Fairly well wooded; healthy. There is a borehole on the holding giving an estimated daily water supply of 57,600 gallons; natives living in the vicinity. Good cattle farm. (13) Watered by a small spring, believed to be permanent; healthy; fairly well wooded; natives living in the vicinity. The farm will shortly be within ten miles of the railway line. (14) Fairly well wooded. There is a well on the holding, containing a small supply of water; considered healthy. Should the present occupant not be the successful applicant the improvements effected on the holding, which consist of a small dwelling-house and well, valued at approximately £35, must be taken over by the lessee, and paid for in cash at a valuation to be fixed by the Minister of Lands. An amount of £31. 9s. has been added to the valuation of the farm in respect of the cost of fencing a portion thereof. (15) Sparsely covered with thorn bush; slightly malarious; natives living in the neighbourhood. There is a borehole on the farm giving an estimated daily water supply of 38,400 gallons. (16) Fairly well wooded; considered healthy; not far distant from a native location; good stock farm. There is a borehole on the holding giving an estimated daily water supply of 1440 gallons. [NOTE.—A clause will be inserted in the lease which it is proposed to issue in respect of those farms on which boreholes have been sunk giving the Government access to and the right to take water from the borehole for drilling purposes for a period of five years from the date of the lease. All applications for these farms must be submitted on the prescribed forms, which, together with copies of the regulations framed under the Act (in which appears a specimen copy of the lease to be issued), can be obtained from the magistrates of the districts in which the farms are situated, or from the Secretary for Lands, Pretoria.]

## FARMS FOR DISPOSAL.

| Holding Number. | Registered Name and Number. | Area. Morgen. | Area. Sq. Roods. | Purchase Price. £ s. d. | Rental during lease period of 5 years. 1st Year, nil. 2nd and 3rd years, 2 per cent. per annum. Half-yearly Rental. £ s. d. | 4th and 5th years, 3½ per cent. per annum. Half-yearly Rental. £ s. d. | If option of conditional purchase be exercised—Half-yearly Instalment, which includes Capital and Interest at 4 per cent. spread over 20 years. £ s. d. | Approximate area of. Pastoral Land. | Approximate area of. Arable Land. | Nearest Railway Station. | Miles. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **RUSTENBURG.** | | | | | | | | | | |
| 1 | Schoongezigt No. 446 ... ... ... | 2623 | 171 | 1336 8 0 | 13 7 3 | 23 7 9 | 48 17 1 | 2623 | | Rustenburg | 104 |
| 2 | Jackalskraal No. 447 ... ... ... | 2710 | 4 | 1391 10 0 | 13 8 4 | 24 7 1 | 50 17 4 | 2710 | | " | 102 |
| 3 | Lennokskraal No. 1049 ... ... ... | 2347 | 584 | 1198 3 0 | 11 19 8 | 20 19 5 | 43 16 0 | 2347 | | " | 90 |
| 4 | Zoetdoorns No. 983 ... ... ... | 1957 | 75 | 1000 19 0 | 10 0 2 | 17 10 4 | 36 11 10 | 1957 | | " | 75 |
| 5 | Schildpaddop No. 1011 ... ... ... | 2156 | 470 | 1047 12 0 | 10 9 6 | 18 6 8 | 38 5 11 | 2156 | | " | 58 |
| | **WATERBERG.** | | | | | | | | | | |
| 6 | Portion "A" of the farm Zamenkomst No. 1791, northern portion | 1080 | 363 | 830 15 0 | 8 6 2 | 14 10 9 | 30 7 4 | 1080 | | Settlers Siding | 19 |
| 7 | Mooigelegen No. 1997 ... ... ... | 1719 | 458 | 887 12 0 | 8 17 6 | 15 10 8 | 32 8 11 | 1419 | 300 | Potgietersrust | 30 |
| 8 | Rijkdom No. 1327 ... ... ... ... | 2236 | 302 | 850 0 0 | 8 10 0 | 14 17 6 | 31 1 5 | 2236 | | Moorddrift | 26 |
| 9 | Portion "C" of the farm Olifants Klip No. 1325 | 709 | 579 | 586 12 0 | 5 17 4 | 10 5 4 | 21 8 10 | 709 | | Naboomspruit | 12 |
| 10 | Portion "D" of the farm Olifants Klip No. 1325 | 708 | 81 | 514 7 0 | 5 2 10 | 9 0 0 | 18 16 0 | 708 | | " | 12 |
| 11 | Rietfontein No. 2237 ... ... ... | 680 | 484 | 265 8 0 | 2 13 0 | 4 12 11 | 9 14 0 | 618 | 60* | Warmbaths | 45 |
| | **ZOUTPANSBERG.** | | | | | | | | | | |
| 12 | Makouwlaagte No. 1781 ... ... ... | 533 | 486 | 426 14 0 | 4 5 4 | 7 9 4 | 15 12 0 | 533 | | Pietersburg | 33 |
| 13 | Brinksrust No. 2187 ... ... ... | 1114 | 589 | 442 4 0 | 4 8 5 | 7 14 9 | 16 3 4 | 1060 | 54 | Louis Trichardt | 36 |
| 14 | Kalkpan No. 1844... ... ... ... | 1018 | 536 | 653 18 0 | 6 10 9 | 11 8 11 | 23 18 0 | 509 | 509 | Pietersburg | 26 |
| 15 | Tijgerfontein No. 1774 ... ... ... | 757 | 471 | 471 3 0 | 4 14 3 | 8 5 0 | 17 4 6 | 379 | 378 | " | 35 |
| 16 | Duikerspruit No. 1764 ... ... ... | 612 | 63 | 314 14 0 | 3 2 11 | 5 10 2 | 11 10 1 | 306 | 306 | " | 37 |

* This holding has two acres of irrigable land.

# Correspondence.

This section will be set aside for correspondence on all subjects affecting the Farming Industries of the Union of South Africa and cognate matters; and, while every reasonable latitude will be allowed, contributors are requested to be as concise and succinct as possible in the expression of their views.

Suggestions for practical consideration and discussion, and hints as to improved methods applicable to any branch of agriculture will be particularly welcome.

It must at all times be distinctly understood that the Department of Agriculture is in no sense responsible for the views and opinions expressed in this section.

All communications should be clearly addressed "The Editor of the *Agricultural Journal*, Department of Agriculture, Pretoria," and written on one side of the paper only.

## VELD-BURNING.

To the Editor of the *Agricultural Journal*.

SIR,—Your notes, and the consequent correspondence, on grass-burning have attracted my notice, and I should like to offer the results of my experience such as it is.

I write from a farm not yet five years in hand, a rough mountain farm where mowing is impossible and close grazing not easy, where the veld is very mixed, but coarse sour grass is the greater portion.

I do not propose to write an essay on the topic; merely some disjointed notes.

You say "steekgrass" must be burned before it seeds. This is impossible, as it is far too green to burn till months after the horrible seeds are a pest to man and beast. So that this defence of burning will not hold water.

As to the point, queried by your correspondents, of the ruining of veld by burning: one cannot but notice, in timber country, that wherever a tree has fallen and been burned, that strip of soil remains barren for years. I have personally tested and proved the fact that a "bonfire" of any sort results in a patch which will grow nothing until manured—which by the way bears on the topic of burning off tobacco seed-beds, etc. It stands to reason, then, that fierce fires of long coarse grass will also, to a lesser extent, cause bareness of the soil round. With regard to the question of overstocking and understocking and their effects on the veld: I have never seen the point raised, but one hears great tales of traffic held up for days, in old times, while herds of buck passed. And one doubts whether in our days farm stock plus game amounts to the same head of grazing stock as game plus farm stock fifty years ago. Can any one make any estimate? With regard to overstocking of paddocks, etc., one must needs notice that this results first in much treading-out of grass; but it also brings trampling and loosening of surface soil, a loose seed-bed in which the seeds of the sweeter grasses are sown in the droppings; sown also well-manured—if the paddocks be not burned—and the next phase is a flood of sweet grass over the paddocks.

With regard to your difference with Mr. Skottowe on the quickness of growth in a grazed paddock, burned *versus* unburned, I have had four years' close observation of two paddocks, one of which is never burned, the other, every year through neighbours' kindly care, partly burned off in a gale. Going down on hands and knees to examine carefully, I find that undoubtedly the burned portion does come up green sooner than the unburned; the burned portion is green before one can discover any green growth at all, searching carefully amongst the unburned grass just beyond the fireline, there is no question of green shoots unnoticed in the old grass—the green is not there. I take it to be the dew getting to the roots on the burned area, whilst it is caught and evaporated on the old grass on the unburned. But a month or so later, when the unburned grass does begin, it "gets a move on" and leaves the burned area out of sight.

In the middle of my paddocks is a tiny one round my house, about 1 morgen, and as I do not care for cows in the kitchen, etc., this remains ungrazed mostly and has to be burned,

But after five years it is sad stuff; whereas the outer paddocks, grazed to extinction and for the most part unburned, have in four to five years completely changed their nature. Here and there, looking carefully, you may find the small remains of a tuft of the original sour grass, but the rest is short and sweet. As I said, it begins in bare patches; but in a year or two the sweet grass floods over them. Incidentally I notice from these old tufts that the ground level has worn down some 3 or 4 inches before the sweet grass covers it and puts a stop to further wear.

As to erosion, the point you pass by, on flat land perhaps it does not matter. But on a slope, the drift of dead grass, twigs, leaves, etc., even if it were of no value as "humus," checks erosion in all directions, which is incredible till one takes careful note. Burning, of course, destroys this; deep grooves form between every tuft of grass, leaving them high enough to die of drought or to be kicked out by cattle, and the actual area of grazing is seriously reduced.—Yours, etc,

C. R. PRANCES.

Mathiaanshoek, P.O. Rankens Pass, Nylstroom.

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To the Editor of the *Agricultural Journal.*

SIR,—I wish to inform your readers about my experience *re* the above. I have found out that grass-burning is very injurious in our part of the country, if small stock are to be kept continually in a good condition (I have only had experience with small stock), and, moreover, burning is the cause of all kinds of disease, more especially gal-lamziekte in goats, also in sheep. When veld has been burnt, naturally all fertilizers, formed by decayed grass, leaves of trees, shrubs, also droppings of animals, are burnt. This causes the earth to become less fertile, and consequently the grass after such a burning is much coarser and also sour. In other words, the grass growing after a burning contains less phosphorus. Lamziekte is therefore caused because the animal does not get enough phosphorus with its feed. Grass growing on veld not burnt is much sweeter because the fertile layer of the earth is much better manured, and also kept loose by the particles of manure covering it. Where leaves of trees and shrubs and decayed grass cover the ground, the upper layer is looser, and is not so compact as veld burnt. To keep one's stock continually in a good condition, the veld ought not to be burnt, because when the grass is about a year old, the stock graze very badly; no doubt they do not like the grass, being coarse and sour. They will always go after veld not burnt before. As soon as they find a patch not burnt for five or six years, they at once graze quietly; surely that is a sign that they find there what they need? I now speak of burning of grass one or two years old, because it must not be forgotten that veld cannot be burnt every year. There would not be enough old grass so that the fire can spread.

There are many other evils consequent on burning, as for instance everlasting green shrubs, volunteer plants, weeds, etc., but my letter is getting too long.—Yours, etc.,

J. J. CLAASE.

Middelputs, P.O. Koopmansfontein, Barkly West.

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To the Editor of the *Agricultural Journal.*

SIR,—In bringing the evil of veld-burning to the notice of all farmers, you did a good work in the interest of the country, especially for those farming on sour veld, and who believe in burning their veld late—who, in order to provide for winter feeding with the least labour and expense, leave the best part of their mountain veld for what is called late burning. Instead of burning their veld in August, before the finer and softer grasses begin to shoot up, when no harm is done in burning, the veld is fired late in December, or even in January, when the very weakest varieties are in full growth. A bad and short-sighted method, yet a great many resort to it. There is no doubt that veld burned after these weak and tender grasses are in growth, results in killing and thinning them out to such an extent that nothing will thrive on the veld thereafter, unless other means are provided. Mr. Editor, I think that a great deal of good could be done by able men, in the way of lectures, while local newspapers could also help in contributing articles on the above subject, thus bringing intelligence to the door of every farmer, and opening the eyes of those who are young to-day and upon whom the welfare of the country will depend in future. We cannot afford to shut our eyes to the supreme importance of helping in teaching the young to know. It is a matter of national interest that the young beginner should start on the right lines, for it is a dismal sight to see so many young men, who should have been well-to-do farmers to-day, running about town and earning a few shillings, just because most of our farms to-day are ruined either through late burning or overstocking.—Yours, etc.,

J. P. H. WINK.

## TRANSMISSION OF BILIARY FEVER AND REDWATER.

To the Editor of the *Agricultural Journal*.

SIR,—In your June issue, Dr. William Robertson says, writing about ticks: "In this case the tick is not the simple carrier of the disease as in the case of biliary fever in the horse or redwater in cattle." It would be very interesting to hear from the Veterinary Research Department whether they consider that it is the same species of tick that transmits biliary fever to the horse and redwater to the cattle. The symptoms of both diseases are so similar in a number of cases, that I am inclined to think that the same tick is responsible for both. If so, would the same cure (trypan blue) or preventive inoculation answer in both cases?—Yours, etc.,

W. P. G. MACPHERSON.

Barberton.

[The Acting Director of Veterinary Research (Dr. William Robertson) replies:—East Coast fever can be transmitted by means of *Rhipicephalus appendiculatus*, Neu. (brown tick), *Rhipicephalus capensis*, Koch (Cape brown tick), *Rhipicephalus evertsi*, Neu. (red tick), and *Rhipicephalus simus*, Koch (black pitted tick). Biliary fever in horses can be transmitted by *Rhipicephalus evertsi* (red tick). Redwater in cattle can be transmitted by *Boophilus decoloratus*, Koch (blue tick). (I must give the scientific names, as ticks are often given different names in different localities.) Biliary fever in horses and East Coast fever in cattle can be transmitted by the same tick, but redwater requires a special kind of blue tick so frequently met with in the coast bushveld. Biliary fever in horses and redwater in cattle belong to the same class of disease, they are both produced by a parasite which obtains entrance to the blood-stream, invades the blood-cells and destroys them; these brokendown blood-cells are passed off in the urine in cattle (and frequently in severe cases of biliary fever in the horse you get bloodstained urine), and are also responsible for the peculiar yellow or orange-yellow colour seen in the organs and mucous membranes of cases of these diseases, due to the blood pigment being set free and staining the tissues (well seen in the mouth and eye in a good case of biliary fever in the horse). Both diseases are caused by a blood parasite called a piroplasm, *P. bigeminum* in the case of redwater and *P. caballa* in the case of the horse. It must be borne in mind that the tick in these diseases is *just a carrier of the piroplasm*. Trypan blue has met with universal success in the treatment of redwater in cattle and should always be employed in biliary fever in the horse. As its value as a curative in the latter disease is still under consideration, the unsuccessful cases may be due to some complication in the infection, as experiments are showing us that there are two piroplasmas responsible for biliary fever, and it may be that one is amenable to trypan blue and the other not.]

## COMPLETE RATION FOR A DAIRY COW.

To the Editor of the *Agricultural Journal*.

SIR,—Will you kindly reply to the following questions:—

(1) Is lucerne hay a complete ration for a dairy cow in full milk?

(2) Is an equal mixture of maize ensilage and lucerne hay a complete ration for a dairy cow in full milk?—Yours, etc.,

H. E. BARRETT.

Box 67, East Rand.

[The Principal of the Potchefstroom School of Agriculture (Mr. E. J. Macmillan) replies:—(1) Lucerne hay does not furnish a complete ration for a dairy cow in full milk. The proportion of protein is greater than necessary, and for this reason it is not an economical feed to be given alone. (2) A mixture in equal parts of maize ensilage and lucerne hay, say 20 lb. of each, is more suitable than lucerne alone, and provides a fairly well-balanced ration. It is not advisable, however, to force the cow to take all her nourishment in bulky form. Better results are obtainable from a ration which is made up in part of feed in a concentrated form. To the ensilage and lucerne an allowance of meal should be added. The following would be a suitable ration for a cow giving, say, 40 lb. of milk daily:— 35 lb. ensilage, 15 lb. lucerne hay, 5 lb. mealie meal, and 2 lb. wheat bran. Ground oats, barley, or rye may be substituted for a portion of the mealie meal or the bran, if more conveniently obtainable. The ration suggested might perhaps be made cheaper by substituting veld hay for a portion of the lucerne, and adding another pound of bran. It is a safe guide to allow about 2 lb. of meal for each gallon of milk.]

## DIPPING SHEEP AND GOATS.

To the Editor of the *Agricultural Journal.*

SIR,—I notice that a good few farmers still persist in mixing their dips when dipping sheep and goats. For instance, half Cooper's and half Little's, or half Cooper's and half tobacco extract, will be taken. The idea is that such a dip is more effective. This is a fallacy and the sooner the minds of farmers can be cleared of this illusion the better. It is a waste of time, energy, and money. Each half in itself is weak and the two together do not make one strong one. To make it more clear I will put it this way: say, for instance, that I were to take half a cup of weak tea and half a cup of weak coffee and mix the two—that would not give me a cup of strong mixture.

It is far better to use a dip by itself and according to the instructions; if that is done I will guarantee that there will be fewer disappointments.—Yours, etc.,

Pretoria. GID. F. JOUBERT.

## BEANS FOR OSTRICH CHICKS.

To the Editor of the *Agricultural Journal.*

SIR,—I will be glad if you or any of your kind readers could inform me, through the medium of your journal, if beans kill ostrich chicks from three to six months old.—Yours, etc.,

Kew-Kew, Fort Beaufort. A. MILDENHALL.

[The Principal, Grootfontein School of Agriculture, Middelburg, Cape Province (Mr. R. W. Thornton), replied:—I do not think beans will kill ostrich chicks three to six months old, but I cannot state definitely, as I have never fed whole beans to chicks. Crushed beans I have used in small quantities and with excellent results. Seed of the millet, which is very hard, is greatly liked by chicks, and it never does them any harm, so that I hardly think the domesticated bean will have a harmful effect. I have always experienced considerable difficulty in getting chicks to eat beans or peas unless these are crushed and fed in a damp state.]

## MAKING TEFF HAY.

To the Editor of the *Agricultural Journal.*

SIR,—We shall be much obliged if you will kindly inform us through the medium of your valuble *Journal* the best way to make teff hay.

When the grass is cut, how long should it be exposed to the sun before raking and putting into cocks?

We believe this grass requires very little bleaching.

Thanking you,—Yours, etc.,

TOOTH BROS.

Kildare, District Thaba 'Nchо,
Orange Free State.

[The Principal of the School of Agriculture, Potchefstroom (Mr. E. J. Macmillan), replies:—The time required for drying teff grass depends on the season and weather conditions. In midsummer during dry weather teff grass may be raked and put into cocks after four or five hours exposure to the sun. A heavy crop is better left lying in swath for a day before being raked. Late in the season, or when the grass is wet from rain, drying is not so rapid, and judgment must be exercised to determine when the hay is fit to be put into cocks. The best hay is made from grass cocked when fairly green and allowed to sweat for several days.]

## MATURING OF EARLY ROSE POTATOES.

To the Editor of the *Agricultural Journal.*

SIR,—I intend planting "Early Rose" potatoes on 1st September; the ground having been well fertilized beforehand, and will also get all the cultivation possible while the crop is in. Firstly, I want to know whether the crop

will be ready for digging by November, provided we have our rains in September. Secondly, does frost completely kill off the crop, or will it grow out again like a young mealie, as we are not safe from frost until after 15th September?

Thanking you in anticipation,—Yours, etc.,

E. H. V.

Carolina, Transvaal.

[The Lecturer in Botany at the Potchefstroom School of Agriculture (Mr. Tom O. Bell) replies:—Early Rose, if well sprouted on 1st September, should be ready for lifting early in November, provided, of course, that they are planted under favourable conditions, that you have early rains, and they are not checked by frost. If they are not severely frosted they will grow out again, but will of course be considerably checked and will not be ready for lifting until a later date, depending upon the severity of "frosting" received.]

## PRESERVING MAIZE STALKS.

To the Editor of the *Agricultural Journal.*

SIR,—I have a field of mealies just beginning to ripen. I should like to keep the stalks for my stock in the dry season. Kindly let me know all particulars as to how to preserve them. Must stalks be quite or half green? Can I pack them in a heap in the open air?

Thanking you in anticipation,—Yours, etc.,

P. J. VERMAAK.

Tygerbosch, P.O. Wolverfontein.

[The Principal of the Potchefstroom School of Agriculture (Mr. E. J. Macmillan) replies:—Under the heading "The Preservation and Use of Maize for Stock Feed," by Mr. J. Burtt-Davy, beginning in the December number of the *Agricultural Journal*, a full description is given of the various methods of harvesting and preserving the maize crop. To secure the greatest feeding value from the stalks and at the same time to obtain the seed, the crop should be cut and placed in shocks when the husk of the ear is brown and ripe, and a portion of the leaves have also lost their colour. The stalks should be cut close to the ground and stood up in shocks at spaces of about ten yards apart. After standing a month in shocks the ears may be taken off and the stalks stored in dry condition in a stack ready for feeding.]

## LIME FOR LUCERNE.

To the Editor of the *Agricultural Journal.*

SIR,—I notice in this month's *Journal* some remarks on "Starting with Lucerne." It is stated that at least 500 lb. of quicklime should be applied per acre. Will ordinary blue building lime answer the same purpose? And how should lime be applied to the soil? I should be very glad to get a copy of the pamphlet mentioned.—Yours, etc.,

Box 32, Florida. A. F. LORD.

[The Principal, School of Agriculture, Potchefstroom (Mr. E. J. Macmillan), replied:—I would state that blue lime as prepared from dolomitic limestone cannot be recommended for fertilizing purposes. Carbonate of lime, i.e. natural limestone ground as fine as possible, is suitable. Slaked or unslaked quicklime, with the exception of the blue dolomitic lime, may be used, but the action is too powerful and not satisfactory. It is regretted that the pamphlet on lucerne mentioned is no longer available, the supply having been exhausted. A good work on lucerne by Coburn is obtainable from booksellers.]

## FIRE-DAMAGED CANE.

To the Editor of the *Agricultural Journal.*

SIR,—Referring to the note in your last issue under "Fire-damaged Cane," an analysis is given for the purpose of showing that the deterioration in cane trashed by burning is more rapid than in the case of unburnt cane. The analysis was taken on the day of burning and

a fresh analysis of the same cane ten days later. But, Mr. Editor, is not this test inconclusive and valueless? It does not show that burnt cane after lying on the ground a certain period is any inferior to unburnt cane cut and lying the same time. Further, it should always be understood that Queensland's climatic conditions and its varieties of canes are entirely different to Natal. In this country uba cane is universally grown. Other varieties were grown here, but now one hardly sees anything but uba. This uba cane is a very hard variety and, owing to its habits of growth and to the tremendous amount of trash which clings and clusters around each cane, efficient handtrashing is rendered very difficult and is comparatively costly and requires a lot of labour. The trashing of the variety by the burning process has become very popular in Natal, owing mainly to the fact that half the labour is needed as compared with handtrashing, and furthermore the system where carried on judiciously has proved itself a sound business proposition. As labour becomes scarce so will the system of handtrashing. I ought to say that it has been established here that by burning the trash of the cane the planter loses in weight, but the sucrose content remains the same in the majority of cases, and the milling concerns who purchase cane by weight, as is the system in Natal, score on the burning system.—Yours, etc.,

F. PICCIONE.

Umhlatuzi, Zululand.

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## TANNIN CONTENT OF TEA.

To the Editor of the *Agricultural Journal.*

SIR,—Our attention is drawn to January issue of the *Agricultural Journal*, page 14, dealing with Natal tea and the statement that the said product has less tannin than any other tea in the world and therefore is more healthful than Indian, Ceylon, and China teas. We are afraid this will be misunderstood by your readers, and that a considerable amount of prejudice against the celebrated Mazawattee Tea has been thereby created in their minds, and as it is not the policy of your *Journal* to favour one section of the commercial community to the detriment of another, we shall be glad if you will take steps to rectify the impression referred to. We therefore respectfully suggest the attention of your readers be drawn to the fact that the article in question must be read in a general way and not to be taken as applying to Mazawattee Tea, in so much as high grade products of Ceylon and India contain the two active principles of tea, viz., caffein and tannin, in properly balanced proportions, thus forming a definite neutral compound. We further respectfully submit for your information the following extract taken from the *Tea and Coffee Trade Journal*, of New York (a well-known technical authority), April issue, page 346, which reads:—"Fine Teas are Most Healthful.—*The Lancet* tells us that there is a strong affinity between two active principles in tea, caffein and tannin, and that in fine teas nature has so balanced the caffein and tannin that neither is present in the free state, but by the perfect balance found in a fine tea they form a definite neutral compound. This is a most important statement, because it is well known that free caffein is injurious, and free tannin is an astringent. Therefore, on high scientific authority the public may rest assured that in good teas, the caffein and tannin being combined in properly balanced proportions, the result is a tea most refreshing as a beverage and most valuable in physiological effect. Such tea, from whatever country it comes, is not only harmless but actually beneficial owing to its mildly stimulating qualities, its agreeable effect upon the circulation and its power of diminishing fatigue."—Yours, etc.,

P.O. Box 595, Johannesburg. T. SIMPSON & CO.

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## EXTERMINATING QUICK GRASS.

To the Editor of the *Agricultural Journal.*

SIR,—With reference to the article on quick grass, by Mr. E. J. Macmillan, on page 278, Vol. V, of the *Agricultural Journal*, we beg to state that we, too, have been worried with quick grass on our lands. Being told that teff grass or barley would kill it, we tried both, and after having ploughed the land to a depth of 7 inches and tooth-harrowing the grass to the surface, we sowed teff grass towards the end of October. This has very effectually killed the quick grass, and we intend putting in barley on other lands were the quick grass grows. Do you think this method, on a whole, would serviceably rid lands altogether of the grass, if the lands are kept cultivated after the teff has done its work?—Yours, etc.,

E. & V. SMITH.

P.O. Doornbult No. 112, Lichtenburg.

Mr. Macmillan replies as follows:—Teff has proved valuable in checking many weeds and grasses. If the conditions are favourable for the growth of teff it will effectually smother other plants. I doubt the value of barley in this respect and cannot recommend it. It will probably be found that harrowing the creeping stems of the quick to the surface has assisted quite as much as the teff crop. Cultivation after the teff has been taken off is advisable.]

## ERADICATION OF WEEDS.

To the Editor of the *Agricultural Journal.*

SIR,—I am ploughing with a three-furrow disc plough, which is sufficiently heavy to do its work in old lands when same are too dry to plough with a mouldboard. I have tried winter ploughing and then re-ploughing in the spring. In October last I continued to plough 8 or 9 inches deep in spite of the drought until I had to give my oxen a chance. In both instances the grass and weeds have been so bad, in spite of the same cultivation, three harrowings and two cultivations, that I am going in future only to plough in the spring after good rains. The soil is fairly sandy loam. Could you tell me if my experience is general and my conclusion correct?—Yours, etc.,

ROBERT S. CHESTER.

Leeuwenbank, P.O. Heilbron,
Orange Free State.

[The Principal of the Potchefstroom School of Agriculture (Mr. E. J. Macmillan) replies:—Correspondent has not stated whether he got a better crop from the land which was twice ploughed. Winter ploughing when the land is very dry and turns up in lumps is, all things considered, not advisable. Ploughing for spring crops is better done during or as soon after the summer rains as possible. The harrow should follow immediately, preserving the moisture as far as possible. A light ploughing will be necessary before seeding. Land thus prepared is in a much better condition for cropping in a dry season than land ploughed in the spring.]

## ERADICATING MOLES.

To the Editor of the *Agricultural Journal.*

SIR,—I had been worried for a lifetime by moles in my garden. I tried all sorts of plans to eradicate them, such as mole-traps, shooting, and dibbling at them with a spade, etc., all to no use. One day, feeling much annoyed at seeing my fine potatoes being ruthlessly destroyed by Mr. Mole, I thought I would give "rough on rats" a trial; the result was a complete success. I have seen nothing of the plague since. I took a medium-sized potato, cut a round top off, and then, cutting in slantingly all round, I scraped out the inside, not too close to the skin. I chopped the contents up and mixed a fair quantity of "rough on rats" and a small quantity of sugar with it and replaced it in the potato shell, then replaced the lid on the potato, keeping it in place with string. I then went to Mr. Mole's rubbish heap and cleared it out, placed the potato right inside the run, and covered the opening with a very small quantity of earth and left it. I kept careful observation over the ground and in a couple of days I saw elsewhere Mr. Mole at work. I felt that my plan was a failure, but would have another try, so I repeated my operation and kept close watch. But from that day till this I have never seen the sign of a mole, not only in my own garden, but also that of my neighbours, which indicates the wide range of the moles' operations.

I give this experience for the benefit of your numerous readers who, I hope, will loose no time in adopting my method at a small cost and a great saving to them.—Yours, etc.,

I. H. T. WELLBELOVED.

48 Albert Street. Rosettenville, Johannesburg.

## FINCHES, SPARROWS, AND WHITE ANTS.

To the Editor of the *Agricultural Journal.*

SIR,—Kindly allow me a small space to get advice from you or one of your many readers.

The greatest difficulties I have had in wheat farming the last few years are with finches, sparrows, and white ants. When the grain begins to form in the ears, the finches and sparrows peck it out and the white ants bite the straw, and then there remains nothing for me. I really only sow for finches, sparrows, and white ants. The only remedy I have is to shoot and drive the birds away and to dig out the queen of the white ants. This helps a lot. But, Sir, is there not an easier way than what I am doing? My remedy is very good when I have servants enough to do it, but what am I to do when I have not got a single servant?—Yours, etc.,

C. J. V. D. WESTHUIZEN.

Vaalkrans, P.O. Paardekraal, via Roodewal, O.F.S.

[For advice on the treatment of white ants we would refer correspondent to the articles on the subject by Mr. Claude Fuller which appeared in the *Journal* a few months back. As regards finches and sparrows, perhaps some of our readers who have had experience in dealing with these pests will come to our correspondent's assistance.—ACTG. ED., *A.J.*]

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## BLUE HYDRAULIC LIME.

To the Editor of the *Agricultural Journal.*

SIR,—Can you tell me whether blue hydraulic lime is suitable for use in building dipping tanks, and also draining floors? Some people maintain it is as good as cement, if not better. I would like to have the opinion of the Agricultural Department. Also whether it is suitable for building houses and dams.—Yours, etc.,

J. P. RHEEDER.

Welgemoed, P.O. Nondweni, Natal.

[The Lecturer in Engineering at the Potchefstroom School of Agriculture (Mr. W. S. H. Cleghorne) replies:—Blue hydraulic lime is quite suitable for use in building houses. It can also be employed for building masonry dipping tanks, the joints being raked out to a depth of at least ¾ inch, and well pointed with a mortar consisting of one part portland cement to two parts clean sharp sand. Blue lime concrete is useless for floors, except as a lower layer which should be covered by at least 2 inches of cement concrete. For low masonry dams up to, say, 15 feet high, a mortar consisting of three parts blue hydraulic lime to one part portland cement to twelve parts clean sharp sand maye b used; the pointing being done with one part portland cement to two parts clean sharp sand.]

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## CONCRETING A STOEP.

To the Editor of the *Agricultural Journal.*

SIR,—I would like to know how many bags of cement I require for a stoep 72 feet by 6 feet at front, 72 feet by 5 feet at back, and 37 feet by 4 feet at sides; also how thick I must apply the concrete, if it is to be done properly.—Yours, etc.,

N. C. VAN NIEKERK.

P.O. Niekerk's Hope,
Via Prieska, Cape Province.

[The Lecturer in Engineering at the Potchefstroom School of Agriculture (Mr. W. S. H. Cleghorne) replies:—I should advise correspondent to first put down a layer of hard-core, 6 inches thick, consisting of broken stone or brick in pieces about the size of one's fist. The hard-core should be well rammed and covered with a layer of concrete, 3 inches thick, in the proportions of one part cement to two parts sand to four parts stone. This should be topped before it has set too hard for proper adherence (say, not more than half a day after laying) by a layer, ¾-inch thick, consisting of one part cement to three of clean sharp sand. This top layer should be divided into squares of 3 or 4 feet side by grooves about ½-inch deep, made by strips of wood which are removed after the concrete has become sufficiently hard. Do not expose concrete after laying

to sun and wind, but keep covered with wet sacks for at least ten days. The quantities of cement you will require are approximately as follows:—

| | | |
|---|---|---|
| Front stoep ... ... ... ... ... ... ... ... ... | 17 | bags. |
| Back stoep ... ... ... ... ... ... ... ... ... | 14 | „ |
| Side stoep ... ... ... ... ... ... ... ... ... | 6 | „ |
| Side stoep ... ... ... ... ... ... ... ... ... | 6 | „ |
| Total ... ... ... ... ... ... | 43 | „ |

It will probably be advisable to purchase only a proportion of the above total amount, and to buy the remainder after the job has been partly finished; in this way the exact amount required can be more nearly gauged.]

# Egg-laying Competitions.

## NOTES AND FIGURES FOR JUNE.

MR. W. O. JOHN, Poultry Division, Elsenburg School of Agriculture, writes :—

I herewith submit report on the Rosebank laying competition.

The weather during June was very variable, several days being hot and sultry, followed by very wet and cold days, which is anything but favourable to heavy egg yield. Many of the runs at the time of my visit were in a very wet condition, this being due to supage, of a spring-like nature, from a bank at the back of the runs, many of which were partly covered with a thin sheet of water. This condition will improve with better weather ; I think, however, that this fact must be mentioned, as I feel sure that it has a detrimental effect on the egg yield of some of the pens. Notwithstanding these somewhat adverse circumstances, the general health of the birds has been well maintained, so much so that I was very surprised at the low record of some of the pens, as their general appearance indicated that they should have been doing better.

One hen from pen 36 died during the month, and was sent for post-mortem examination to the Senior Veterinary Surgeon at Capetown, who reported cause of death as acute hyperaemia (congestion of the liver). This hen has been replaced. The daily menu remains unchanged. Pen 4 still maintains premier position for number of eggs laid, with a total for the two months of 155 ; the eggs from this pen are on the small side. Pen 7 makes a good second, with a total of 149. Pen 20 comes third with 114. This pen is forging ahead as will be seen by the May yield of 44 and June 70. Pen 13 occupies fourth place with a total of 112 ; this pen has made good progress during June, more than doubling its May output. Pen 18 is in the fifth position with a total of 109 ; these birds have fallen off considerably during the last month. Pen 19 is in the sixth position with a total of 106 ; here again good progress has been made. All the

other pens as will be seen are still below the 100 mark for the two months.

The birds reported as moulting are now getting through nicely and, given favourable weather, should soon commence laying.

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## ROSEBANK EGG-LAYING COMPETITION.

## WESTERN PROVINCE AGRICULTURAL SOCIETY.

(*1st May*, 1913, *to* 30*th April*, 1914.)

RECORD FOR JUNE, 1913.

| Pen Number. | Owner. | Variety. | Record for June. | Total to 30th June. |
|---|---|---|---|---|
| 1 | F. T. Mills ... ... ... ... | White Rocks ... ... | 12 | 34 |
| 2 | N. H. M. Cole ... ... ... ... | White Wyandottes ... | 40 | 61 |
| 3 | F. T. Mills ... ... ... ... | White Rocks ... | 0 | 0 |
| 4 | S. C. Skaife ... ... ... ... | White Wyandottes ... | 74 | 155 |
| 5 | E. F. Watermeyer ... ... ... | Croad Langshans ... | 13 | 27 |
| 6 | H. H. Bright ... ... ... ... | White Leghorns ... | 21 | 29 |
| 7 | S. Smith ... ... ... ... ... | " ... | 79 | 149 |
| 8 | N. H. M. Cole ... ... ... ... | Brown Leghorns ... | 47 | 92 |
| 9 | Jas. Cook... ... ... ... ... | White Leghorns ... | 39 | 74 |
| 10 | R. G. Hudson ... ... ... ... | " ... | 26 | 65 |
| 11 | N. H. M. Cole ... ... ... ... | " ... | 21 | 58 |
| 12 | Hatherley Poultry Farm ... ... | " ... | 52 | 75 |
| 13 | C. S. Boyes ... ... ... ... | " ... | 78 | 112 |
| 14 | H. H. Bright ... ... ... ... | " ... | 31 | 43 |
| 15 | Mrs. R. F. Dott ... ... ... ... | " ... | 26 | 58 |
| 16 | T. Vollmer ... ... ... ... | " ... | 0 | 2 |
| 17 | " ... ... ... ... | " ... | 21 | 27 |
| 18 | C. W. Baldock ... ... ... ... | " ... | 44 | 109 |
| 19 | S. Smith ... ... ... ... ... | " ... | 67 | 106 |
| 20 | Mrs. R. Archibald ... ... ... | " ... | 70 | 114 |
| 21 | B. Kauffmann ... ... ... ... | " ... | 48 | 84 |
| 22 | G. J. V. Biccard... ... ... ... | " ... | 37 | 50 |
| 23 | C. S. Boyes ... ... ... ... | " ... | 10 | 12 |
| 24 | H. H. Bright ... ... ... ... | " ... | 25 | 37 |
| 25 | S. Smith ... ... ... ... ... | " ... | 44 | 58 |
| 26 | W. L. H. Rose ... ... ... ... | " ... | 7 | 32 |
| 27 | H. N. Wheeldon ... ... ... ... | " ... | 29 | 88 |
| 28 | B. Kauffmann ... ... ... ... | Black Leghorns ... | 16 | 77 |
| 29 | O. C. Macpherson ... ... ... | White Leghorns ... | 24 | 47 |
| 30 | W. and H. Meihuizen ... ... ... | " ... | 22 | 40 |
| 31 | Graham Hope & Co. ... ... ... | " ... | 29 | 89 |
| 32 | H. Curtis... ... ... ... ... | " ... | 3 | 23 |
| 33 | A. Aitken... ... ... ... ... | " ... | 0 | 5 |
| 34 | R. G. Hudson ... ... ... ... | " ... | 18 | 37 |
| 35 | H. H. Bright ... ... ... ... | Black Leghorns ... | 7 | 7 |
| 36 | G. J. V. Biccard... ... ... ... | White Leghorns ... | 12 | 31 |
| 37 | W. H. Hart ... ... ... ... | " ... | 15 | 28 |
| 38 | R. G. Hudson ... ... ... ... | " ... | 8 | 18 |
| 39 | B. Kauffmann ... ... ... ... | " ... | 33 | 65 |
| 40 | Mrs. R. A. Leggatt ... ... ... | Anconas ... ... | 34 | 49 |

## ELSENBURG MONTHLY REPORT FOR JUNE OF EGGS LAID BY BREEDING PENS.

| Pen No. | Breeds. | No. of Hens. | May Eggs. | June Eggs. | Total Eggs. | Remarks. |
|---|---|---|---|---|---|---|
| 1 | Indian Game ... | 3 | 23 | 11 | 34 | 1 Hen broody, 6 days. |
| 2 | Black Rocks ... | 4 | 37 | 30 | 67 | |
| 3 | White Rocks ... | 4 | 53 | 67 | 120 | 1 Hen sat on eggs 14 days. |
| 4 | White Wyandotte | 6 | 86 | 64 | 150 | 1 Hen sick for 7 days. |
| 5 | Barred Rocks ... | 3 | 50 | 39 | 89 | |
| 6 | White Leghorns... | 5 | 67 | 73 | 140 | |
| 7 | Black Minorcas ... | 6 | Nil. | Nil. | Nil. | |
| 8 | Black Leghorns ... | 6 | 61 | 65 | 126 | |
| 9 | Brown Leghorns | 6 | 32 | 31 | 63 | |
| 10 | White Orpingtons | 4 | 94 | 75 | 169 | All four hens broody during month for periods of 3 to 5 days. |

The weather during the whole month was very unfavourable for heavy egg yields, as our runs are very exposed. Pen 10 still maintains the lead, notwithstanding broodiness and the fact that this pen only contains four hens. I am of opinion that all the birds would have done better had we been able to continue mealie meal as part of the breakfast ration, but owing to a shortage of mealies our birds had to do without for the whole month.

Notwithstanding rains and cold weather, the general health of the stock is well maintained.

W. O. JOHN, Poultry Division.

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### MANAGER'S REPORT FOR JUNE, 1913.

There is a fairly satisfactory increase in the egg yield this month, taking into account those pens not yet over the moult and also the extremes of weather experienced, and which were not quite seasonable. The birds are feeding well and many of them look like adding many eggs to their credit before long.

The heavy breeds are not doing so well as was expected this month; only pen 2 has given a larger number of eggs than last month, and it is possible that a little more protection from cold and wind at night during the cold weather might be beneficial. A famine in green food threatened to be a difficulty at the commencement of the month, but a fairly regular supply of cabbage leaves has been obtained and should last until lucerne, etc., comes on again. Seedbeds of mangolds and 1000 headed kale have been put in, and the young plants are growing nicely and will be ready for planting out the end of July, whilst some cabbage plants are already planted on the site of the old pens. The feeding during the month has been the same as in May except that cooked liver was given on three days early in the month for a change, and cracked mealies also were added to the morning grain twice a week, now the weather is colder. Grass is occasionally cut up and given with the sprouted oats. Owing to heavy rains some drains have been made to carry off the water quickly from the back of the pens, but there is still a soakage from the bank. The health of the birds has improved, but a number have had ailments of some kind during the month.

No. 76 of pen 31, mentioned last month as having cloacitis (an offensive discharge from the vent) has recovered, but the owner replaced it, as it was not thought advisable to run any risk of contagion. No. 136D of pen 12 had bronchitis, the symptoms being a rattle in the throat and cough. She was kept warm and inhaled steam from hot water having a few drops of eucalyptus in, and given three drops of camphor in a teaspoonful of glycerine four times a day and soft warm food to eat, soon recovering. No. 60 of pen 36 was put in hospital with scabby eruptions on side of face, a soft crop distention, and loss of weight. The former soon improved, and for the latter a little permanganate of potash in slightly warm water was injected into crop several times and the contents forced out. Then in a few minutes a little bread and milk squeezed dry was given with a grain or two of bisurated magnesia. The bird, however, continued to lose weight and died on the fifth day—a post-mortem examination by the Government veterinary surgeon showing the cause of death to be acute hyperaemia (congestion of the liver), all the other organs being apparently

normal. One bird in Pen No. 31 was treated for worms and two others ejected these troublesome pests, which are more common than suspected; they affect both the health and egg production. The bird in pen 20 which recovered from dyptheric croup was returned to owner and replaced. No. 128, Pen No. 24, had an attack of bronchial catarrh and was treated as the bird in pen 12 mentioned above, and gradually recovered, but was replaced. No. 73 sent from up-country has not yet recovered from the journey, as it was apparently without water during the time, the comb being dark purple and the feathers ruffled, and it had to be carefully fed on soft food for some days. It will probably be at least a month before it lays.

Pens 1 and 3 still backward, but combs reddening; pen 2 improving and looking fit; pen 4 slackened off laying owing to two birds being broody, eggs small; pen 5, one still moulting, others promising; pen 6, four very fit, two not ready, should give good account soon: pen 7, one bird slight moult, eggs improving in size; pen 8, one bird backward, others look first rate; pen 9, all look promising; pen 10, three not up in comb, others fit; pen 11, four red in comb, two not ready; pen 12, all look very fit; pen 13, good level lot, doing well; pen 14, three fairly fit, others not quite; pen 15, one not over moult, others look well; pen 16, all getting nicely over moult; pen 17, over moult and should lay well any day; pen 18, four should do well, two nearly ready; pen 19, three looking well, others coming on; pen 20, five likely layers, one improving; pen 21, even birds, reddening nicely; pen 22, not quite fit, but coming on; pen 23, should lay well now; pen 24, three fit, others improving; pen 25, one not up in comb, others looking fit; pen 26, one of pens suffered most in moult, now looking up; pen 27, two still not over moult, others fit; pen 28, looking first rate, but rested a few days; pen 29, not yet fit, but much improved; pen 30, looking well and should lay shortly; pen 31, two slight moult on neck, others look fit except one to replace; pen 32, two not quite over moult, others fit; pen 33, good type and will do well next month; pen 34, improving and fit for laying; pen 35, looking very fit, begun laying, good workers; pen 36, getting nicely over moult; pen 37, one still moulting, others coming on: pen 38, improving, but still rather backward; pen 40, laying nicely now.

The weather has been very changeable, from cold to warm spells every few days. The first week was cold and showery, followed by several warm days on the 13th to 15th. The night temperature on the 14th was 56 degrees and day 68 degrees; then the 22nd was the coldest of month, 37 degrees was registered at night, with slight frost at a lower level. Several days were very cold at night, but warm and sunny during the day. Considering these changes, the birds are in good health at end of month, although the 29th was the first day no bird was in the hospital.

S. A. WEST, Manager.

# South African Produce Markets.

## CAPETOWN.

The Produce Department of the firm of R. Müller, Capetown, reports under date of the 29th July, 1913, as follows :—

*Ostrich Feathers.*—Yesterday the auction sales started in London. Cable news report a good attendance. Short blacks, dark feminas, drabs, and floss remained unchanged, whilst other kinds of feathers showed a decline yesterday, which, however, may still experience some change for the better whilst the sales are continuing.

Both as to quantities and qualities, average parcels have changed hands in the Capetown market, both out of hand and by public auction. The competition proved fair throughout, so that sellers have every reason to be satisfied. Local manufacturers are in want of certain lines. Ostrich farmers as well as dealers in ostrich feathers in the country will therefore do well to consign to Capetown all that they may have to offer for sale.

The Capetown market continues strong and this may be anticipated with a fair amount of certainty on account of the local industry which is adopting quite considerable dimensions.

The following are the present prices :—

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| Primes | 18 | 0 | 0 | to | 37 | 0 | 0 |
| First | 10 | 10 | 0 | „ | 16 | 10 | 0 |
| Second whites | 7 | 0 | 0 | „ | 9 | 10 | 0 |
| Third whites | 4 | 10 | 0 | „ | 6 | 0 | 0 |
| Inferior and stalky whites | 2 | 10 | 0 | „ | 4 | 0 | 0 |
| Byocks and fancy | 3 | 0 | 0 | „ | 10 | 0 | 0 |
| Superior feminas | 12 | 10 | 0 | „ | 15 | 10 | 0 |
| First feminas | 8 | 0 | 0 | „ | 11 | 0 | 0 |
| Second feminas | 5 | 10 | 0 | „ | 8 | 0 | 0 |
| Third feminas | 2 | 10 | 0 | „ | 4 | 10 | 0 |
| Greys | 3 | 10 | 0 | „ | 9 | 0 | 0 |
| White boos | 1 | 10 | 0 | „ | 3 | 0 | 0 |
| Light boos | 1 | 0 | 0 | „ | 1 | 15 | 0 |
| Dark boos | 0 | 5 | 0 | „ | 0 | 15 | 0 |
| Inferior boos and tipless | 0 | 5 | 0 | „ | 1 | 5 | 0 |

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| Long blacks | 3 | 0 | 0 | to | 5 | 10 | 0 |
| Medium blacks | 1 | 0 | 0 | „ | 2 | 10 | 0 |
| Short blacks | 0 | 5 | 0 | „ | 0 | 15 | 0 |
| Long floss blacks | 1 | 10 | 0 | „ | 2 | 0 | 0 |
| Medium floss blacks | 0 | 17 | 6 | „ | 1 | 10 | 0 |
| Short floss blacks | 0 | 5 | 0 | „ | 0 | 10 | 0 |
| Long drabs | 2 | 0 | 0 | „ | 3 | 10 | 0 |
| Medium drabs | 0 | 10 | 0 | „ | 2 | 0 | 0 |
| Short drabs | 0 | 2 | 6 | „ | 0 | 10 | 0 |
| Long floss drabs | 1 | 15 | 0 | „ | 2 | 5 | 0 |
| Medium floss drabs | 0 | 17 | 6 | „ | 1 | 10 | 0 |
| Short floss drabs | 0 | 5 | 0 | „ | 0 | 10 | 0 |
| Inferior long blacks and drabs | 0 | 15 | 0 | „ | 2 | 10 | 0 |
| Common blacks and drabs | 0 | 2 | 0 | „ | 0 | 5 | 0 |
| Spadonas | 1 | 0 | 0 | „ | 5 | 10 | 0 |

*Wool.*—On the 15th instant the auction sales closed in London. Notwithstanding the moderate attendance, competition proved strong for all and any desirable lots. Cape scoureds as well as light clothing wools rose in price up to ½d., and heavy clothing wools up to ¼d. Combing sorts realized former prices and partly receded ¼d.

Moderate quantities of wool have been sold in this market since my last report. This is quite in keeping with the winter season, especially as we have had a considerable rainfall in a good many districts. Most of the wool recently offered for sale here consisted of Calvinia growth, for which prices have declined about ¼d. per lb.

| | d. | | d. |
|---|---|---|---|
| Calvinia, long | 7 | to | 7¾ |
| Calvinia, medium | 6 | „ | 7 |
| Karroo and Roggeveld | 6 | „ | 9½ |
| Short burry wools, heavy | 4 | „ | 4¾ |
| Short burry wools, light | 4¾ | to | 5½ |
| C. and C., best grease | 6 | „ | 6¼ |
| C. and C., medium | 5 | „ | 6 |
| C. and C., inferior | 2 | „ | 4 |

*Skins.*—At this month's auction sales held in London, 114,000 goatskins found buyers out of a total of 290,000 skins. Full rates were paid for dry damageds, heavy weight skins were unsaleable. Sundrieds receded ¼d., and other sorts experienced a reduction of ½d.

The Capetown market continues surprisingly steady. Prices paid here locally are altogether in favour of sellers, whom I would urgently advise not to delay in sending their consignments to the Capetown market, where excellent prices are being paid for all and any good skins, whilst quantity is no object.

| | |
|---|---|
| Goatskins, light | 12¾d. per lb. |
| Goatskins, medium | 11d. per lb. |
| Sundried and kids | 8d. per lb. |
| Angoras | 7d. per lb. |
| Angoras, bastard | 10d. per lb. |
| Angoras, shorn | 5½d. per lb. |

| | | | |
|---|---|---|---|
| Caledon | 7d. per lb. | Capes, large | 3s. 5d. each. |
| Longwools, Karroo | 6½d. per lb. | Capes, medium | 2s. 7d. each. |
| Shortwools | 5¼d. per lb. | Capes, cut | 1s. 7d. each. |
| Pelts and damaged | 4½d. per lb. | Capes, damaged and lambs | 7d. each. |

*Hides.*—It is a pleasure being able to report that for heavy sound hides as much as 11d. per lb. is being paid here now, and 8d. per lb. for damaged hides.

Also in this line the Capetown market continues to take up any quantities.

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## EAST LONDON.

The Produce Department of Messrs. Malcomess & Co., Ltd., write as follows under date 29th July, 1913:—

We confirm our respects of the 27th ult., and are now able to report on the fourth series of London Colonial wool sales, which opened on the 1st inst., with offerings comprising

160,000 bales Australians and
11,000 bales Capes.

The attendance was fair and the tone good, but the opening reports nevertheless read:—

| | |
|---|---|
| Long heavy combing grease | Mostly ½d. lower. |
| Short grease | Par to 5 per cent. lower. |
| Super combing grease and snow-whites were | Unchanged. |

The drop we attribute chiefly to the financial stringency and the general decline in industrial circles. As the sales progressed the heavy and less desirable classes of wools showed further weakness, and thus gave a rather clear indication of the bad results buyers had obtained from them during the last long wool season.

The sales finally closed on the 15th inst., practically on the same level as the opening except that long heavies were possibly somewhat weaker. The quantities held over were, however, extreme.

| | | | |
|---|---|---|---|
| 63,000 | bales Australians | out of 160,000 | bales offered. |
| 5,000 | „ Capes | „ 11,000 | „ |
| 68,000 | „ | „ 171,000 | „ |

and these large quantities held over are the best sign of the hand-to-mouth policy which is forced on manufacturers by the dear money and labour unrest and political anxiety.

Our friends report "prospects uncertain" with the quantity for the fifth series Colonial wool sales opening on the 23rd September limited to 145,000 bales.

The Bradford market has gone back to 28½d. from the 29d. level in force during last month, and business there seems quiet. There is still a tremendous congestion of wools in the combing mills, still to be worked up.

The Continental markets have fair business to report, but holders have to accept a fraction less occasionally, the holiday season and the hand-to-mouth policy of buying being the cause.

Our local market is featureless. Stocks consist mostly of long heavy combings, practically impossible of sale, while the few lots of snow-whites that are offered are usually taken at full current rates.

Quotations are purely nominal, most sorts not being available:—

| | d. | d. |
|---|---|---|
| Transkeis, good, clean, dry lots | 8 | to 8½ |
| Transkeis, average lots | 7½ | „ 8 |
| Basutos, good to average lots | 6½ | „ 7 |
| Super short Kaffrarian farmers' | 8 | „ 10 |
| Super long Kaffrarian farmers' | 8 | „ 11 |
| Super short well-conditioned grassveld | 6 | „ 9 |
| Super long well-conditioned grassveld | 6½ | to 9½ |
| Short faulty grease | 4½ | „ 7½ |
| C. and C. grease (good average) | 5½ | „ 6½ |
| „ „ (very kempy to inferior) | 3 | „ 5 |

*Mohair.*—There is nothing to report and we quote nominally:—

| | d. | d. |
|---|---|---|
| Super summer kids | 20 | to 25 |
| Average summer kids | 16 | „ 20 |
| Super long summer firsts | 12½ | „ 13½ |
| Super short summer firsts | 12 | „ 12½ |
| Sortings according to quality and length | 5½ | to 7½ |
| Coloured hair, up to | | 6½ |

*Sundry Produce.*—This market has shown the greatest weakness during the month under review. Thus in London the

Hides sales marked a decline of ⅛d. to ¼d. on most sorts,
Goats „ „ ½d. per lb. generally,
Angora „ „ ⅜d. to ⅝d. per lb.,

and finally sheep skins declined in London ⅜d. for extra long woolled skins, ⅜d. to ½d. for long and medium woolled skins, ¼d. for other sorts generally, and prospects are reported as uncertain and not encouraging. Our quotations therefore have to be amended as follows:—

| | | | |
|---|---|---|---|
| Sundried hides | 12⅜d. | Sheepskins—1st quality | 6d. |
| Dry-salted hides | 11⅜d. | „ C. and C. skins | 5½d. |
| Goatskins | 11¼d. | „ Do. including Capes | 5¾d. |
| Bastards | 9½d. | „ Pelts | 4¼d. |
| Angora skins | 8d. | „ Transkeis | 4¾d. |
| Damaged | 5d. each. | Horns, according to quality and size (each) | 2d. to 3d. |

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## DURBAN.

Messrs. Reid & Acutt's Wool Mart, Ltd., Esplanade, Durban, report as follows under date 31st July, 1913:—

Since last reporting a month ago, the Durban market has remained practically bare of supplies, as a consequence of which there is very little of interest to advise.

The July series of London auctions closed on the 17th idem, when we received the following cable message from our correspondents in regard to the course of values, viz.:—

"London, 18th July, 1913. Sales have closed compared with closing rates of last series:—

| | |
|---|---|
| Grease combing, light | Par. |
| „ heavy | 5 per cent. lower. |
| Grease clothing, light | 2½ per cent. higher. |
| „ heavy | 2½ per cent. higher. |
| Snow-whites, all descriptions | Par." |

From this it will be seen that, as is usually the case, heavy-conditioned combing wools have been the first to experience a decline in values.

*Mohair.*—This staple has been in brisk inquiry during the month, prices generally being well maintained throughout.

*Coarse and Coloured.*—Local demand has shown some slight diminution during the last week or so, which has had the effect of slightly reducing values.

The following are the prices current here to-day:—

### NATAL AND EAST GRIQUALAND.

*Midlands.*

| | d. | | d. | |
|---|---|---|---|---|
| Sorted clips, light and clean | 10 | to | 12 | Nominal. |
| Unsorted clips, light and clean | 9 | „ | 10½ | |
| Short to medium lambs | 7½ | „ | 8½ | |
| Medium to long lambs | 8½ | „ | 10 | |

*Utrecht and Vryheid.*

| | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 8½ | to | 9¼ |
| 12 months' average clips, light and clean | 7¼ | „ | 7¾ |
| 6 to 9 months average | 6½ | „ | 7½ |
| Short to medium lambs | 7 | „ | 8½ |
| Medium to long lambs | 8¼ | „ | 9¼ |

*Ladysmith, Newcastle, Dundee, etc.*

| | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 9 | to | 10 |
| 12 months' average clips, light and clean | 7½ | „ | 8½ |
| 6 to 9 months average | 6½ | „ | 7¼ |
| Short to medium lambs | 7¼ | „ | 8¾ |
| Medium to long lambs | 8½ | „ | 9½ |

*East Griqualand.*

| | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 8¾ | to | 9¼ |
| 12 months' average clips, light and clean | 7¼ | „ | 7¾ |
| 6 to 9 months light and clean | 6¼ | „ | 7 |
| Short to medium lambs | 6¾ | „ | 7¾ |
| Medium to long lambs | 7¾ | „ | 8½ |

## TRANSVAAL.

| *Volksrust, Wakkerstroom, Ermelo, Amersfoort, etc.* | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 9 | to | 10 |
| 12 months' average clips, light and clean | 7¾ | „ | 8¾ |
| 6 to 9 months average | 6½ | „ | 7¾ |
| Short to medium lambs | 7¼ | „ | 8½ |
| Medium to long lambs | 8 | „ | 9¼ |

| *Standerton, Bethal, Middelburg, etc.* | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 8 | to | 9 |
| 12 months' average clips, light and clean | 7 | „ | 7¾ |
| 6 to 9 months average | 6 | to | 7 |
| Short to medium lambs | 6¼ | „ | 7½ |
| Medium to long lambs | 7¼ | „ | 8 |

| *Heidelberg, Pretoria, Potchefstroom, Klerksdorp, Lichtenburg, etc.* | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 7½ | to | 8¼ |
| 12 months' average clips, light and clean | 6½ | „ | 7¼ |
| 6 to 9 months average | 6 | „ | 6¾ |
| Short to medium lambs | 5¾ | „ | 7 |
| Medium to long lambs | 6¾ | „ | 7½ |

## ORANGE FREE STATE.

| *Harrismith, Vrede, Bethlehem, Heilbron, etc.* | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 8 | to | 9¼ |
| 12 months' average clips, light and clean | 7¼ | „ | 8 |
| 6 to 9 months average | 6¼ | „ | 7¼ |
| Short to medium lambs | 6½ | „ | 7¾ |
| Medium to long lambs | 7¾ | „ | 8¾ |

| *Lindley, Kroonstad, Vredefort, Parys, etc.* | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 7¾ | to | 8¾ |
| 12 months' average clips, light and clean | 7 | „ | 7½ |
| 6 to 9 months average | 6 | „ | 6¾ |
| Short to medium lambs | 6½ | „ | 7½ |
| Medium to long lambs | 7½ | „ | 8¼ |

| *Senekal, Ficksburg, Ladybrand, Winburg, etc.* | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 7¾ | to | 8½ |
| 12 months' average clips, light and clean | 6¾ | „ | 7¼ |
| 6 to 9 months average | 5¾ | „ | 6½ |
| Short to medium lambs | 6¼ | „ | 7¼ |
| Medium to long lambs | 7 | „ | 8 |

| *Coarse and Coloured.* | d. | | d. |
|---|---|---|---|
| Free from kemps | 5½ | to | 6¼ |
| Ordinary | 4¼ | „ | 5¼ |
| Inferior, kempy, and Persian | 2 | „ | 3 |

## BASUTOLAND AND NATIVE WOOLS.

| | d. | | d. |
|---|---|---|---|
| Superior lots, light and clean | 6¼ | to | 7 |
| Average lots, light and clean | 5½ | „ | 6¼ |
| Average lots, heavy and wasty | 5 | „ | 5½ |
| Transkei, good | 7 | to | 8¼ |
| Transkei, ordinary | 6 | „ | 7 |

## MOHAIR.

| | d. | | d. |
|---|---|---|---|
| Kids, good length and super quality | 13 | to | 17 |
| Long blue, super quality | 12 | „ | 13 |
| Long blue, average | 11 | „ | 12 |
| Good winter | 9½ | to | 10½ |
| Short and mixed winter | 8½ | „ | 9½ |
| Inferior and coloured | 3 | „ | 6 |

## BASUTOLAND AND NATIVE MOHAIR.

| | d. | | d. |
|---|---|---|---|
| Good length and quality | 11 | to | 12 |
| Average lots | 10 | „ | 11 |
| Inferior and short mixed | 6 | to | 8 |

## HIDES, SKINS, HORNS, ETC.

All descriptions are in good demand, hides being in special request.

*Hides.*—Sundried, 14 to 20 lb. average, 10½d. to 12½d. per lb.; sundried, inferior, 8d. to 9d.; salted, 8½d. to 10d.

*Sheepskins.*—Long-woolled, 5½d. to 6½d. per lb.; short-woolled, 3½d. to 4½d; pelts, 1½d. to 3d.; coarse and coloured, 3d. to 5d.; salted, heavy, 4d. to 5¼d.

*Goatskins.*—Mixed parcels, sound, 4d. to 6½d. per lb.; inferior, 2d. to 3d.

*Horns.*—3d. to 12d. per pair.

*Wattle Bark.*—This article shows signs of further improvement as will be seen from our revised quotations, which are as follows:—

Cut and bagged, good colour and quality, 4s. 6d. to 5s. 6d. per cwt.; cut and bagged, inferior colour and quality, 3s. to 4s. 6d. per cwt.; uncut in bundles, good colour and quality, 3s. to 4s. per cwt.; uncut in bundles, inferior, 2s. to 3s. per cwt.

# The Weather.

By C. STEWART, B.Sc., Chief Meteorologist, Department of Irrigation.

THE day temperatures were considerably higher than usual over the Cape Province, the south of Natal, and the south of the Transvaal during the month of June. In the centre and south of the Orange Free State and the north-west of Natal they were somewhat lower, and over the remainder of the Union the departure from the normal conditions was but slight. The night temperatures were higher in the Cape, in the Orange Free State, in the north-east of Natal, and in the north and south-west of the Transvaal, and lower in other parts. The mean air temperature over the Union generally was half a degree above the normal. Frosts were frequent.

The rainfall for the month was rather above the normal in the Cape Province, Natal, and Swaziland, and over the remainder of the Union only a few scattered thunderstorms occurred. The distribution of the rains over the month was uneven, dry spells lasting from the 1st to the 6th, and from the 8th to the 27th, occurring in the Cape. The year's rainfall (from 1st January) shows a slight excess in the north and extreme south-west of the Transvaal, in Swaziland, and in the south-east, centre, and north of the Cape, and a considerable excess in Natal and the adjoining Cape coastal regions, where abnormal weather conditions prevailed in February and March last. Over the remainder of the Union there is a deficit.

### WEATHER CHARACTERISTICS OF THE MONTH OF SEPTEMBER.

With the advent of September there is generally a diminution in the rainfall along the western coast of the Union and an increase over the eastern districts. In the northern part of the Cape Province the minimum monthly rainfall is reached, while the Transvaal and Orange Free State may anticipate the commencement of the rainy season. The heaviest rains are usually experienced over the Cape Peninsula, the normal there being approximately 3½ inches. The south-eastern and coastal districts and the eastern Transvaal may expect 2 inches, while the western Transvaal, Orange Free State, and the remainder of the Cape Province will probably not exceed an inch. Occasional, although infrequent, thunderstorms may occur.

There will be a general rise in temperatures, the normals ranging from about 66° in Natal and the eastern Transvaal, through 60° on the Transvaal high veld and 58° in the Orange Free State, to 55° in Basutoland and on the northern Karroo. Frosts may, nevertheless, reasonably be expected, although their frequency and intensity will be rapidly diminishing.

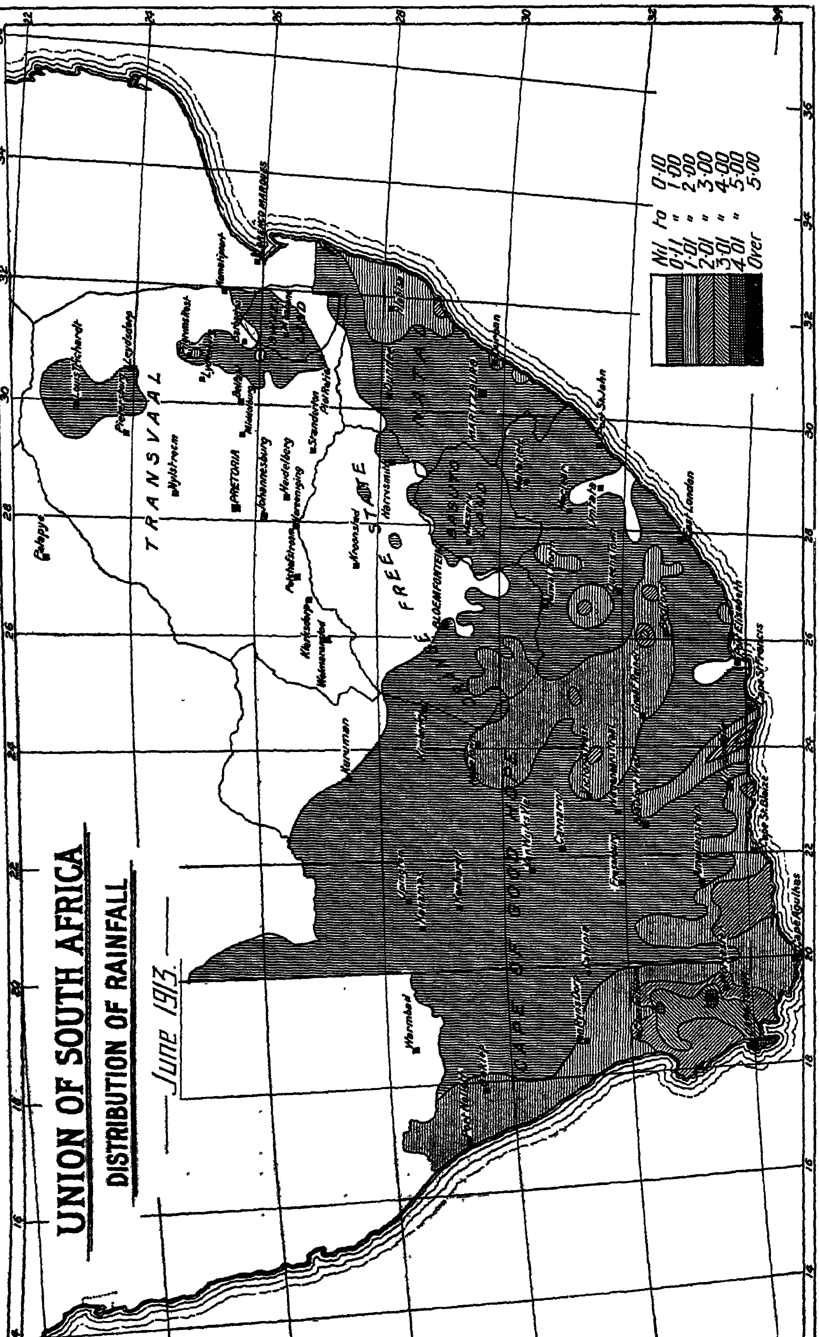
The prevailing winds of the Transvaal, heavily laden with moisture, are from northerly to north-easterly; over the northern borders of the Cape Province from a southerly and over the south-eastern districts from a north-easterly direction. It should be rather calm over the Cape Peninsula with light southerly winds preponderating.

OBSERVATIONS OF TEMPERATURES (FROM SELF-REGISTERING THERMOMETERS IN THERMOMETER SCREENS)—JUNE, 1913.

| PLACE. | OBSERVER. | MONTH—JUNE, 1913. | | | Normal Monthly Temperature. | Difference from Normal. | EXTREMES. | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean Max. | Mean Min. | Monthly Temperature. | | | Highest. | Date. | Lowest. | Date. |
| | | ° | ° | ° | ° | ° | ° | | ° | |
| *Transvaal*—Louis Trichardt ... | S.-Sergt. J. C. N. Clark | 70·3 | 47·7 | 56·5 | 56·8 | —0·3 | 79·0 | 7th | 36·0 | 30th. |
| Pietersburg ... ... | W. Frankleyne ... | 69·4 | 37·7 | 53·6 | 53·8 | —0·2 | 78·0 | 4th | 35·0 | 9th, 14th, 16th, 17th, 19th, & 29th. |
| Zeerust ... ... | H. Dietrich, J.P. ... | 67·0 | 33·9 | 50·4 | 50·5 | —0·1 | 74·5 | 4th | 28·1 | 20th. |
| Pretoria (Arcadia) ... | J. Lyall Soutter ... | 69·1 | 35·0 | 52·1 | 52·6 | —0·5 | 76·0 | 19th | 29·3 | 17th. |
| Belfast ... ... | E. F. Schmidt ... | 61·1 | 30·4 | 45·7 | 46·1 | —0·4 | 70·0 | 12th | 23·0 | 15th. |
| Mbabane (Swaziland). | A. C. Hulett ... | 67·3 | 44·4 | 55·8 | 56·0 | —0·2 | 75·0 | 5th, 16th, 18th & 22nd | 38·0 | 1st and 29th. |
| Johannesburg (Obser.) | Staff ... ... | 60·6 | 41·6 | 51·1 | 50·4 | +0·7 | 67·5 | 4th | 31·5 | 8th. |
| Potchefstroom ... | J. R. Stenning ... | 68·9 | 33·5 | 51·2 | 49·6 | +1·6 | 75·5 | 4th | 20·4 | 20th. |
| Komatipoort ... ... | H. J. Evans ... | 79·3 | 46·6 | 62·9 | 63·1 | —0·4 | 89·0 | 5th | 39·0 | 9th. |
| *Free State*—Bloemfontein ... ... | J. Arndt ... ... | 62·2 | 34·9 | 48·6 | 47·1 | +1·5 | 68·6 | 4th | 28·7 | 9th. |
| Lindley ... ... | J. Oates ... ... | 64·0 | 29·0 | 46·5 | 46·8 | —0·3 | 69·5 | 5th | 19·5 | 20th. |
| Harrismith ... ... | J. B. Patterson ... | 59·9 | 34·9 | 47·4 | 45·7 | +1·7 | 66·5 | 19th | 28·0 | 8th, 26th, & 27th. |
| *Natal*—Durban ... ... | Capt. Black ... | 65·3 | 54·8 | 60·1 | — | — | 71·0 | 4th and 6th | 50·0 | 30th. |
| Maritzburg ... ... | Govt. Asylum ... | 75·8 | 39·6 | 57·7 | 57·6 | +0·1 | 86·0 | 22nd | 34·0 | 27th. |
| Dundee ... ... | T. Kenny ... ... | 69·9 | 37·0 | 53·5 | 52·4 | +1·1 | 77·0 | 5th | 33·0 | 7th, 8th, 16th, & 21st |
| Hlabisa ... ... | J. Swarbrick ... | 78·9 | 55·4 | 67·1 | — | — | 82·0 | 6th, 10th, 14th, 17th, 18th, & 22nd | 52·0 | 8th, 25th, & 26th. |
| *Cape*—Kokstad ... ... | H. D. Coyte ... | 65·3 | 32·9 | 49·1 | — | — | 72·6 | 22nd | 28·0 | 28th. |
| Murraysburg ... ... | A. Cameron ... | 61·9 | 35·3 | 48·6 | 46·0 | +2·6 | 68·0 | 22nd | 26·0 | 19th. |
| Queenstown ... ... | A. Brown ... ... | 65·1 | 38·1 | 51·6 | 51·2 | +0·4 | 72·0 | 4th & 21st | 29·0 | 4th. |
| Bedford ... ... | Thos. Hall ... ... | 67·7 | 44·6 | 56·1 | 55·2 | +0·9 | 76·0 | 11th | 35·0 | 25th. |
| East London ... ... | M. C. Grogan ... | 72·0 | 50·8 | 61·4 | 60·4 | +1·0 | 86·0 | 16th | 44·0 | 20th. |
| Capetown (Observatory) | The Staff ... ... | 64·0 | 50·3 | 57·2 | 55·5 | +1·7 | 78·8 | 25th | 41·8 | 10th. |
| Wynberg ... ... | Sister Mary Imelda | 66·3 | 47·5 | 56·9 | 54·6 | +2·3 | 79·2 | 25th | 41·2 | 7th. |
| Mossel Bay ... ... | A. Draper ... ... | 68·8 | 48·7 | 58·8 | 58·4 | +0·4 | 83·0 | 17th | 43·0 | 1st & 23rd. |
| Port Elizabeth ... | P. E. Morgan ... | 70·5 | 51·7 | 61·1 | 59·1 | +2·0 | 85·0 | 15th | 44·0 | 25th. |

RAINFALL RETURN FOR JUNE, 1913.

| Place. | Observer. | Month. June, 1913. | Month. Normal. | Month. Difference from Normal. | Year. From 1st Jan., 1913. | Year. Normal. | Year. Difference from Normal. |
|---|---|---|---|---|---|---|---|
| *Transvaal—* | | ins. | ins. | ins. | ins. | ins. | ins. |
| Komatipoort ... | H. J. Evans ... | 0·10 | 0·19 | —0·09 | 14·96 | 16·20 | —1·24 |
| Christiana ... | S. W. Davis ... | 0·00 | 0·08 | —0·08 | 14·53 | 12·60 | +1·93 |
| Pilgrims Rest ... | E. Elphinstone ... | 0·37 | 0·34 | +0·03 | 24·93 | 26·06 | —1·13 |
| Belfast ... ... | E. Schmidt ... | 0·00 | 0·14 | —0·14 | 17·41 | 16·58 | +0·83 |
| Zeerust ... ... | H. Dietrich, J.P.... | 0·05 | 0·06 | —0·01 | 13·90 | 15·38 | —1·48 |
| Middelburg ... | Dr. H. A. Spencer | 0·00 | 0·10 | —0·10 | 12·29 | 15·05 | —2·76 |
| Pretoria (Arcadia) | J. Lyall Soutter... | 0·00 | 0·07 | —0·07 | 17·68 | 16·95 | +0·73 |
| Standerton ... | A. von Backstrom | 0·02 | 0·04 | —0·02 | 15·72 | 16·56 | —0·84 |
| Pietpotgietersrust | S.A.M.R. ... | 0·00 | 0·01 | —0·01 | 17·27 | 13·67 | +3·60 |
| Johannesburg ... | Observatory Staff | 0·00 | 0·04 | —0·04 | 12·50 | 16·72 | —4·22 |
| Louis Trichardt ... | Sgt. J. C. M. Clark | 0·40 | 0·38 | +0·02 | 18·16 | 17·99 | +0·17 |
| Pietersburg ... | W. Frankleyne ... | 0·00 | 0·01 | —0·01 | 14·20 | 11·30 | +2·90 |
| *Swaziland—* | | | | | | | |
| Mbabane... ... | Swaziland Police | 0·99 | 0·41 | +0·58 | 28·07 | 28·04 | +0·03 |
| *Cape—* | | | | | | | |
| Mafeking ... | J. Krept ... ... | 0·00 | 0·01 | —0·01 | 12·46 | 12·69 | —0·23 |
| Vryburg ... ... | J. T. Morrison ... | 0·00 | 0·45 | —0·45 | 12·12 | 19·28 | —7·16 |
| Kenhardt ... | A. E. Bowker ... | 0·76 | 0·19 | +0·57 | 2·21 | 4·20 | —1·99 |
| Griquatown ... | E. Hanstein ... | 0·90 | 0·56 | +0·34 | 12·50 | 10·30 | +2·20 |
| Prieska ... ... | M. Drummer ... | 0·54 | 0·25 | +0·29 | 7·94 | 7·43 | +0·51 |
| Kimberley ... | G. Neville ... | 0·63 | 0·41 | +0·22 | 12·10 | 11·51 | +0·59 |
| Hopetown ... | Gaoler ... | 1·27 | 0·35 | +0·92 | 8·18 | 9·40 | —1·22 |
| Garies ... ... | A. Vossela ... | 0·73 | 0·70 | +0·03 | 1·69 | 2·42 | —0·73 |
| Clanwilliam ... | W. J. Downes ... | 2·72 | 1·35 | +1·37 | 4·31 | 4·44 | —0·13 |
| Van Rhynsdorp ... | T. J. Shaw ... | 1·54 | 0·89 | +0·65 | 2·83 | 3·29 | —0·46 |
| Fraserburg ... | P. J. Booysen ... | 0·45 | 0·44 | +0·01 | 7·38 | 4·99 | +2·39 |
| Britstown ... | P. A. Myburgh ... | 0·86 | 0·71 | +0·15 | 8·62 | 7·98 | +0·64 |
| Carnarvon ... | J. Sullivan ... | 0·83 | 0·34 | +0·49 | 5·91 | 6·25 | —0·34 |
| Victoria West ... | H. A. Houghton... | 1·23 | 0·41 | +0·82 | 8·92 | 7·56 | +1·36 |
| Murraysburg ... | A. Cameron ... | 1·43 | 0·33 | +1·10 | 9·11 | 7·88 | +1·23 |
| Philippstown ... | P. W. Tivzen-Kal | 1·92 | 0·47 | +1·45 | 9·57 | 9·70 | —0·13 |
| Hanover ... ... | W. J. Myburgh ... | 0·89 | 0·51 | +0·38 | 7·90 | 10·07 | —2·17 |
| Aliwal North ... | J. P. Casteling ... | 0·44 | 0·68 | —0·24 | 10·24 | 15·81 | —5·57 |
| Queenstown ... | H. Holley ... | 0·90 | 0·49 | +0·41 | 14·71 | 14·60 | +0·11 |
| Kokstad ... | H. D. Coyte ... | 0·41 | 0·52 | —0·11 | 19·11 | 14·84 | +4·27 |
| Umtata ... ... | Forrest Officer ... | 0·09 | 0·52 | —0·43 | 14·61 | 13·63 | +0.98 |
| Port St. Johns ... | J. F. Lloyd ... | 0·73 | 1·88 | —1·15 | 39·68 | 22·97 | -16·71 |
| Piquetberg ... | Gaoler ... | 2·62 | 2·84 | —0·22 | — | 9·47 | — |
| Worcester ... | W. B. Sutton ... | 1·65 | 1·51 | +0·14 | 3·84 | 5·26 | —1·42 |
| Capetown Observ. | The Staff... ... | 3·35 | 4·07 | —0·72 | 9·50 | 12·95 | —3·45 |
| Wynberg ... | Sister Mary Imelda | 6·60 | 6·77 | —0·17 | 16.82 | 19·10 | —2·28 |
| Sutherland ... | C. R. Bester ... | 1·46 | 0·89 | +0·57 | 4·47 | 5·97 | —1·50 |
| Swellendam ... | H. Montgomery... | 1·81 | 2·07 | —0·26 | 8·28 | 16·84 | —8·56 |
| Mossel Bay ... | G. Draper ... | 1·87 | 1·13 | +0·74 | 6·05 | 8·91 | —2·86 |
| Beaufort West ... | J. E. Stevens ... | 0·83 | 0·21 | +0·62 | 7·44 | 5·24 | +2·20 |
| Uniondale ... | E. J. Stewart ... | 0·99 | 1·11 | —0·12 | 7·93 | 7·19 | +0·74 |
| Knysna ... ... | C. Wilding ... | 2·26 | 2·16 | +0·10 | 9.06 | 13·02 | —3·96 |
| Graaff-Reinet ... | J. A. Simpson ... | 1·77 | 0·41 | +1·36 | 11·16 | 9·35 | +1·81 |
| Steytlerville ... | P. R. de Wet ... | 0·26 | 0·31 | —0·05 | 10·54 | 5·00 | +5·54 |
| Port Elizabeth ... | P. E. Morgan ... | 0·65 | 1·40 | —0·75 | 9·26 | 9·14 | +0·12 |
| Bedford ... | Gaoler ... ... | 1·82 | 0·75 | +1·07 | 16·29 | 15·29 | +1·00 |
| East London ... | Port Captain ... | 0·40 | 1·03 | —0·63 | 19·86 | 12·41 | +7·45 |
| *Orange Free State—* | | | | | | | |
| Lindley ... ... | Jno. Oates ... | 0·02 | 0·17 | —0·15 | 9·68 | 14·80 | —5·12 |
| Harrismith ... | J. B. Patterson ... | 0·18 | 0·23 | —0·05 | 12·32 | 15·85 | —3·53 |
| Bloemfontein ... | — ... | 0·11 | 0·44 | —0·33 | 11·13 | 14·68 | —3·55 |
| *Natal—* | | | | | | | |
| Maritzburg ... | Govt. Asylum ... | 0·72 | 0·31 | +0·41 | 31·60 | 16·43 | +15·17 |
| Dundee ... ... | I. Kenny... ... | 0·32 | 0·31 | +0·01 | 18·19 | 18·71 | —0·52 |
| Hlabisa ... ... | J. Swarbrick ... | 1·81 | 1·03 | +0·78 | 36·07 | 21·28 | +15·79 |
| Port Shepstone ... | A. B. Cox ... | 0·95 | 1·40 | —0·45 | 30·13 | 24·92 | +5·21 |
| Durban ... ... | Capt. Black ... | 1·03 | 0·76 | +0·27 | 42·63 | 20·26 | +22·37 |


UNION OF SOUTH AFRICA
DISTRIBUTION OF RAINFALL
June 1913.
Nil to 0·10
0·11 " 1·00
1·01 " 2·00
2·01 " 3·00
3·01 " 4·00
4·01 " 5·00
Over 5·00
TRANSVAAL
FREE STATE
NATAL
BASUTO LAND
CAPE OF GOOD HOPE
PRETORIA
Johannesburg
BLOEMFONTEIN
Port Elizabeth
East London
Durban
Cape Agulhas
Cape St. Francis

# Current Market Rates of Agricultural Produce and Stock.

The following TABLE OF CURRENT MARKET RATES OF AGRICULTURAL PRODUCE AND LIVE STOCK on Saturday, 2nd August, 1913, ruling at the several Centres named, is published for general information.

| Centre. | A. Wheat per 100 lb. | B. Wheat Flour per 100 lb. | C. Boer Meal per 100 lb | D. Mealies per 100 lb. | E. Mealie Meal per 100 lb. | F. Barley per 100 lb. | G. Oats per 100 lb. | H. Oat-hay per 100 lb. | J. Lucerne Hay per 100 lb. | K. Potatoes per 100 lb. | L. Tobacco (Boer Roll) per lb. | M. Beef per lb. | N. Mutton per lb. | O. Fresh Butter per lb. | P. Eggs per dozen. | Q. Cattle (Slaughter). | R. Sheep (Slaughter). | S. Pigs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | £ s. d. | s. d. | £ s. d. |
| *Cape Province:* | | | | | | | | | | | | | | | | | | |
| Aliwal North ... | 12 6 | 21 0 | 16 6 | 9 6 | 11 6 | 11 0 | 11 0 | 7 6 | 3 9 | 9 0 | 1 3 | 0 6 | 0 6 | 1 3 | 1 0 | 12 10 0 | 15 6 | *2 10 0 |
| Beaufort West ... | 13 0 | 17 6 | 13 6 | 7 0 | 9 0 | 11 0 | 8 0 | 4 6 | 5 0 | 11 6 | 1 0 | 0 5 | †0 4 | 1 4 | 1 6 | 10 0 0 | 15 0 | 4 0 0 |
| Capetown ... | 7 0 | — | — | — | — | 8 8 | 6 8 | — | 7 0 | 12 8 | 0 4 | — | — | 1 3 | 1 6 | — | — | — |
| East London ... | 9 6 | 18 6 | 29 0 | 6 0 | 15 0 | 8 0 | 9 0 | 6 0 | 6 6 | 12 0 | 1 0 | 0 5 | 0 6 | 1 9 | 1 6 | 12 0 0 | 17 0 | 1 7 0 |
| Grahamstown ... | 12 6 | — | — | 7 6 | — | 7 5 | 9 0 | 7 0 | 6 0 | 14 0 | 0 6 | 0 6 | 0 5¾ | 2 0½ | 1 4 | — | — | — |
| Kimberley ... | 12 0 | 16 0 | 14 9 | 6 6 | 6 6 | 9 6 | 7 0 | 5 6 | 6 9 | 13 0 | 0 6 | 0 6½ | 0 5 | 1 6 | 1 3 | 11 10 0 | 13 0 | 4d. p. lb. |
| Kingwilliamstown | 13 6 | 18 6 | 14 0 | 6 0 | 7 0 | 7 6 | — | 6 6 | — | 10 3 | 0 6 | 0 6 | 0 6 | 1 6 | 1 0 | 14 0 0 | 16 0 | 3d. l.wt. |
| Port Elizabeth ... | 10 6 | — | — | 7 6 | — | 7 6 | 8 0 | 6 0 | — | 13 0 | — | 0 7 | 0 7 | 1 10 | 1 11 | — | — | 2 5 0 |
| Queenstown ... | 4 6 | 16 6 | 13 6 | 7 0 | 11 6 | — | 9 6 | — | 6 6 | 10 6 | 0 10 | — | 0 4 | 1 6 | 1 6 | — | — | — |
| *Natal:* | | | | | | | | | | | | | | | | | | |
| Durban ... | — | — | — | 6 0 | — | — | — | — | — | 12 6 | — | — | — | 1 6 | 1 9 | — | — | — |
| Pietermaritzburg | 12 0 | — | — | 5 7 | — | 12 0 | 10 0 | 6 9 | 4 6 | 10 0 | 0 4 | 0 5 | 0 6½ | 1 5 | 1 0 | — | — | — |
| *Transvaal:* | | | | | | | | | | | | | | | | | | |
| Pretoria ... | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Johannesburg ... | 9 6 | — | — | 5 9 | 7 0 | 8 0 | 7 6 | 7 0 | 6 6 | 14 2 | 0 2 | — | — | 1 3 | 1 1 | — | — | — |
| *Orange Free State:* | | | | | | | | | | | | | | | | | | |
| Bloemfontein ... | 12 0 | — | 31 0 | 6 0 | 7 0 | 8 6 | 6 6 | 5 6 | 5 6 | 12 0 | 1 0 | 0 6 | 0 4½ | 1 3 | 0 9 | — | — | — |
| Harrismith ... | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

* Average, £2 to £3. † Average, 3d. to 5d.

# Farm Employment.

NOTE.—*This section is open to persons desiring to obtain employment on the land, and to farmers who require farm assistants. Notices are inserted in several succeeding issues; and advertisers are requested to advise the Editor as soon as their requirements are filled in order that their notices may be deleted.*

SITUATIONS WANTED.

Employment wanted by applicant, 40 years of age, with family. 25 years' experience in stock and agricultural farming. Will accept employment in any part of the Union.—D. J. ERASMUS, c/o G. Nel, 66 Delarey Street, Vrededorp, Johannesburg. [6]

A steady, healthy man of 26 years of age (married) desires situation on farm as manager. Thoroughly acquainted with general farming business. Speaks Dutch and Kaffir only.—J. L. FOURIE, Slaapkrantz, P.O. Clifford, Barkly East. [6]

Young colonial-born Englishman, age 18 years, desires position as learner on South African farm, Natal Province preferred. Strong, healthy, and willing to do any hard work.—EDWARD COX, Box 126, Pietermaritzburg. [6]

Scotsman (30), well educated, active, healthy, offers services in return for board, lodging, and nominal salary. Highest references.—GRANT, Box 4675, Johannesburg. [6]

Situation wanted on farm by married man, age 50 years. Has one son. Has experience of general farming. Testimonials can be given.—D. J. STEYN, P.O. Belfast, Transvaal. [6]

Learner on farm, age 36, with 5 months' sound experience in up-to-date farm work, wishes position with small salary and board.—EDGAR, Box 2217, Johannesburg. [6]

Applicant, age 24, desires position as manager or overseer of sheep farm. Good testimonials from leading Australian sheep-breeders.—T. PICKBURN, P.O. Box 2337, Johannesburg. [6]

Young man, age 20, brought up on farm, desires situation on farm, preferably in Eastern Province. Has attended Elsenburg School of Agriculture for two years; first class references; strong and not afraid to work; speaks kaffir well.—H. C. TROW, Butterworth, Transkei. [7]

Situation wanted on farm as manager by married man (no children), 49 years of age. Experienced in cattle and sheep farming in Natal and high veld. Stock inspector for two years. Will work either for salary or in return for stock. Good references. High veld or Orange Free State preferred.—T. C. VAN ROOYEN, c/o Mr. F. Lademan, Doornkloof, P.O. Box 93, Premier Mine, Transvaal. [7]

Situation desired as farm manager in Transvaal, Orange Free State, or Cape Province. Experienced in all branches of general and stock farming, including ostriches. Speaks English and Dutch. State terms.—F. PIENAAR, Rustenburg, Transvaal. [7]

Young man (South African), aged 20, seeks employment on a South African farm. Has a knowledge of farming in general, cattle, sheep, lucerne, butter-making, etc. Good testimonials.—S. GREEN, c/o A. Schutz, Nelspruit, Transvaal. [8]

Employment wanted by applicant, aged 24 years, on a farm, as manager or general assistant. Good references.—F. WOODHEAD, "Cibowie," Avenue le Sueur, Sea Point, C.P. [8]

Applicant, 26 years of age, with 7 years' experience both in stock and agriculture farming in the Orange Free State, desires situation as farm manager. Speaks Dutch, English, and Sesuto fluently.—J. P. CELLIERS, Malima Private Bag, Kestell, O.F.S. [8]

Young Hollander, 24 years of age, seeks employment in return for board and lodging. Good testimonials. Speaks English.—A. G. LAMBERT, Box 12, Bethal. [8]

German, aged 23, wishes to obtain employment on a farm for the purpose of acquiring a knowledge of the farming methods employed in the Union. Has had good experience in horses, cattle, sheep, dairying, and agriculture generally. Has qualified in veterinary science. Is prepared to work for a small wage or to make other arrangements.—MAX FIRNSTEIN, Box 1216, Capetown. [8]

Applicant, with eight years' practical and successful experience in Western Australia in the opening up of virgin forest and scrub country for the purpose of growing cereals, seeks employment either as assistant or manager.—F. R. PARAMOR, Nimberrin, via Baandee, Western Australia. [8]

Applicant, healthy, steady, and not afraid of work, 27 years of age, unmarried, seeks employment on farm in Orange Free State or Transvaal. Served six years apprenticeship on Western Province farm. Fair knowledge of general farming; ostriches a speciality. Would be willing to manage farm on salary, or share and salary basis. Speaks Dutch and English.—J. BRAND, c/o Chief Inspector of Grain, Department of Agriculture, Pretoria. [8]

## SITUATIONS VACANT.

Wanted on a farm, suitable for cultivation of tobacco, cotton, and maize, a young man of between 18 and 20 years of age. Part of crops will be given.—LOUIS G. TRICHARDT, P.O. Braakkloof, Rustenburg. [6]

Young man who wishes to learn farming wanted on a farm four hours from Middelburg, Transvaal.—F. J. VAN EEDEN, P.O. Boesmans Pan, Middelburg, Transvaal. [6]

The undermentioned offers (*a*) 80 morgen of arable land on half share. Owner will provide all implements, etc., except servants; (*b*) 200 morgen of uncultivated land at 1/3rd share; (*c*) six burgher-right erven at Belfast, situated near to or adjoining each other, and are suitable for growing potatoes. Can be had by paying annual rates and taxes on these erven. For (*a*) and (*b*) persons possessing some stock will receive preference.—R. A. KNIPE, P.O. Tweedronk, Standerton. [6]

Miss A. E. Pullinger, well known in the bee-keeping world, has a vacancy for one pupil for the approaching active season. Terms to be arranged.—Address, Freshwater Apiary, Berg River Station, C.P. [7]

Man with first-class stock and agricultural farm wants partner with capital of £1500 to invest in certain class of breeding stock, not subject to any disease prevalent in South Africa. No costs attached to breeding this particular class of animals. Return of at least 75 per cent. per annum of invested money guaranteed.—Apply C.L., 14 Pretorius Street, Pretoria. [7]

Experienced man wanted to take over large orchard, chiefly apples, either on salary or share.—"ORCHARD," Clocolan, O.F.S. [7]

Farm assistant wanted—one experienced in thrashing and shelling machinery.—"OUTFIT," Clocolan, O.F.S. [7]

Wanted on a farm on Crocodile River, District Pretoria, young South African with own span of oxen, in return for half of crops. Can also make money by working for owner. Terms as regards wages, time, grazing, etc., to be arranged.—C.M., c/o *Agricultural Journal*, Pretoria. [8]

Strong girl or woman wanted to assist on poultry farm, either as learner or help. Terms to be arranged.—E.W., c/o *Agricultural Journal*, Pretoria. [8]

Wanted on a farm suitable for cultivation of tobacco and cotton, and with very fertile soil for any cereal, a man who will cultivate the land on his own account.—GEO. J. TRICHARDT, Mahobieskraal, P.O. Tussenkomst, Rustenburg. [8]

# Outbreaks of Animal Diseases.

THE following outbreaks of scheduled infectious and contagious animal diseases have occurred in the areas specified during the month ended 31st July, 1913.

C. E. GRAY,
*Principal Veterinary Surgeon (Union).*

## CAPE PROVINCE PROPER.

(EXCLUDING TRANSKEIAN TERRITORIES.)

| Disease. | District. | Area or Name of Farm. | Number of Deaths. | Number of Animals Affected. | Number of In-contacts. | Number of Animals Tested. | Number of Animals Reacted and Destroyed. | Number of Doubtful Reactors to be Retested. |
|---|---|---|---|---|---|---|---|---|
| Anthrax ... | Albany ... ... | Grahamstown Commonage ... ... ... ... | 1 | — | Unkn. | — | — | — |
| | Hay ... ... | Farm Witsands, Griquatown ... ... ... ... | 2 | — | " | — | — | — |
| | Barkly West ... | Delpoorts Hope ... ... ... ... ... ... | 1 | — | " | — | — | — |
| | Komgha ... ... | Farm Sec. 29 xiii/32 ... ... ... ... ... | 1 | — | 18 | — | — | — |
| | " ... ... | Farm 256 ... ... ... ... ... ... ... | 1 | — | 102 | — | — | — |
| | " ... ... | Farm 275 ... ... ... ... ... ... ... | 1 | — | 20 | — | — | — |
| | " . ... | Farm Sec. 18 xiii/37 ... ... ... ... ... | 1 | — | 10 | — | — | — |
| | " ... ... | Farm Sec. xiii/22 .. ... ... ... ... ... | 1 | — | 71 | — | — | — |
| | " ... ... | Farm Sec. 19 xiii/38 ... ... ... ... ... | 1 | — | 20 | — | — | — |
| | " ... ... | Farm Lot 37, Ngwenkalu ... ... ... ... | 1 | — | 45 | — | — | — |
| | " ... ... | Farm 6, Lot 3 ... ... ... ... ... ... | 1 | — | 26 | — | — | — |
| | Queenstown ... | Forest Range ... ... ... ... ... ... | 1 | — | Unkn. | — | — | — |
| Glanders ... | Cathcart ... ... | Glen Rennox, Highlands ... ... ... ... ... | — | 2 affect. & destrd. | — | 13 | Nil | — |
| | Port Elizabeth ... | Parliament Street ... ... ... ... ... ... | — | — | — | 23 | 4 | — |
| Scabies (Equine) | Humansdorp ... | Patentie ... ... ... ... ... ... ... | — | 1 | — | — | — | — |
| | Malmesbury ... | Vredenburg ... ... ... ... ... ... | — | 2 | — | — | — | — |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Scabies (Equine) | Port Elizabeth ... ... | Walmer ... ... ... ... ... ... ... | — | 1 | — | — | — | — |
| | Uitenhage ... ... | Thornhill ... ... ... ... ... ... ... | — | 1 | — | — | — | — |
| Tuberculosis ... | Cape ... ... | Various ... ... ... ... ... ... ... | — | — | — | 190 | 19 | Nil |
| | Malmesbury ... | " ... ... ... ... ... ... ... | — | — | — | 58 | 2 | Nil |
| | Paarl ... ... | " ... ... ... ... ... ... ... | — | — | — | 11 | Nil | Nil |
| | Stellenbosch ... | " ... ... ... ... ... ... ... | — | — | — | 232 | 5 | Nil |

Districts of the Cape Province in which East Coast Fever is prevalent :—East London, Kingwilliamstown, and Komgha.

NATAL.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| East Coast Fever | Alfred ... ... | Slexl ... ... ... ... ... ... .. | 5 | — | 5 | — | — | — |
| | Ixopo ... ... | Philpots ... ... ... ... ... ... ... | — | — | — | — | — | — |
| | Ladysmith .. ... | Schoemansdal ... ... ... ... ... ... | — | — | — | — | — | — |
| | Lower Umzimkulu .. | Benbridge ... ... ... ... ... ... .. | 1 | — | 5 | — | — | — |
| | Vryheid ... ... | Palmietfontein ... ... ... ... ... ... | — | — | — | — | — | — |
| | " ... ... | Glukshalt ... ... ... ... ... ... ... | — | — | — | — | — | — |
| | Zululand ... ... | Lot 200, Empangeni ... ... ... ... ... | 1 | — | 362 | — | — | — |
| Anthrax ... | Newcastle ... ... | Highton ... ... ... ... ... ... ... | — | — | — | — | — | — |
| | Lions River ... | Aird... ... ... ... ... ... ... ... | — | — | — | — | — | — |
| Epizootic Lymphangitis | Lower Umzimkulu... | No. 6 Location ... ... ... ... ... ... | — | — | — | — | — | — |
| Mange in Equines | Zululand ... ... | Eshowe ... ... ... ... ... ... ... | — | — | 2 | — | — | . |

*Note re East Coast Fever infection in Natal* :—With the exception of Lower Tugela, every Magisterial Division in Natal is infected with East Coast Fever.

## TRANSVAAL.

| Disease. | District. | Area or Name of Farm. | Number of Deaths. | Number of Animals Affected. | Number of In-contacts. | Number of Animals Tested. | Number of Animals Reacted and Destroyed. | Number of Doubtful Reactors to be Retested. |
|---|---|---|---|---|---|---|---|---|
| Glanders ... | Middelburg ... | Middelburg Farm ... ... ... ... ... ... | 1 | — | 9 | 9 | — | — |
| Anthrax ... | Zoutpansberg ... | Vleifontein No. 338 ... ... ... ... ... | 1 | — | 50 | — | — | — |
| | Krugersdorp ... | Vogelstruisfontein No 62... ... ... ... ... | 1 | — | 28 | — | — | — |
| | " ... | Roodepoort No. 43 ... ... ... ... ... | 1 | — | 18 | — | — | — |
| | Zoutpansberg ... | Ashmole Dales ... ... ... ... ... ... | 1 | — | 140 | — | — | — |
| | Marico ... ... | Zeerust ... ... ... ... ... ... ... | 1 | — | 8 | — | — | — |
| | Lichtenburg ... | Hibernia No. 20 ... ... ... ... ... ... | 1 | — | 500 | — | — | — |
| | " ... | Pietfontein ... ... ... ... ... ... ... | 1 | — | 14 | — | — | — |
| | " ... | Hibernia No. 20 ... ... ... ... ... ... | 1 | — | 499 | — | — | — |
| | Witwatersrand ... | Leeuwpoort No. 4 ... ... ... ... ... ... | 1 | — | 25 | — | — | — |
| | " ... | 109 Howard Street, Benoni ... ... ... ... | 1 | — | 23 | — | — | — |
| | Marico ... ... | Linocana ... ... ... ... ... ... ... | 1 | — | 18 | — | — | — |
| | " ... ... | Vanggatbult No. 35 ... ... ... ... ... | 1 | — | 24 | — | — | — |
| Tuberculosis ... | Middelburg... .. | Patatafontein No. 327 ... ... ... ... ... | — | — | — | 42 | 4 | — |
| | Krugersdorp ... | Lancaster Gold Mine ... ... ... ... ... | — | — | — | 6 | 1 | — |
| | Middelburg... ... | Arendsfontein No. 332 ... ... ... ... ... | — | — | — | 14 | 1 | — |
| | Ermelo ... ... | Ermelo Town ... ... ... ... ... ... | — | — | — | 2 | 1 | — |

Districts in Transvaal in which East Coast Fever is prevalent :—Zoutpansberg, Carolina, Barberton, Piet Retief, Rustenburg, Lydenburg, and Pretoria.

## ORANGE FREE STATE.

| Disease. | District. | Area or Name of Farm. | Number of Deaths. | Number of Animals Affected. | Number of In-contacts. | Number of Animals Tested. | Number of Animals Reacted and Destroyed. | Number of Doubtful Reactors to be Retested. |
|---|---|---|---|---|---|---|---|---|
| Glanders ... | Winburg ... ... | Winburg ... ... ... ... ... ... ... ... | — | — | 10 | 12 | 2 | — |
| Tuberculosis (in Pigs) | Bloemfontein ... | Bloemfontein Market ... ... ... ... ... | 1 | — | — | — | — | — |
| Anthrax ... | Kroonstad ... ... | Besterskraal ... ... ... ... ... ... ... | 1 | — | 300 | — | — | — |
| " ... | " ... ... | Palmietspruit ... ... ... ... ... ... ... | 1 | — | — | Unknown. | | — |

TRANSKEI.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| East Coast Fever | Tsolo ... ... | N'tabas ... ... ... ... ... ... ... | 1 | — | 32 | — | — | — |
| | " | Londias ... ... ... ... ... ... ... | 1 | — | 1572 | — | — | — |
| | Qumbu ... ... | M'tengwanis ... ... ... ... ... ... | 3 | — | 35 | — | — | — |
| | " | M'vubuis ... ... ... ... ... ... ... | 12 | — | 30 | — | — | — |
| | Mount Frere ... | Mnginis ... ... ... ... ... ... ... | 1 | — | 84 | — | — | — |
| | Nqamakwe .. ... | Maxegwanas ... ... ... ... ... ... | 1 | — | 25 | — | — | — |
| | " ... | Mtebeles ... ... ... ... ... ... ... | 2 | — | 41 | — | — | — |
| Anthrax ... | Kentani ... ... | Molosis, Doses ... ... ... ... ... .. | — | — | — | — | — | — |
| | " ... ... | Nzimagagas, Simngas ... ... ... ... ... | — | — | — | — | — | — |
| | " ... ... | Velebayis and Mandendis Locations ... ... .. | — | — | — | — | — | — |
| | Umtata . ... | Umtata Mission Station ... ... ... ... ... | — | — | — | — | — | — |
| | Butterworth ... | Muzipos Location ... ... ... ... ... ... | — | — | — | — | — | — |
| | Nqamakwe . ... | Sobekwas Location ... ... ... ... .. | — | — | — | — | — | — |
| Lung-sickness ... | Ngqelina ... ... | Gadlas ... ... ... ... ... ... ... ... | 1 | — | 146 | — | 2 | — |
| | " ... ... | Lindinxiwas ... ... ... ... ... ... | — | — | 8 | — | 3 | — |
| | Mqanduli ... ... | Macwis ... ... ... ... ... ... ... | — | — | — | — | 1 | — |
| Glanders ... | Tabankulu ... ... | Tabankulu Village ... ... ... ... ... ... | — | — | — | — | 1 | — |

Districts free from East Coast Fever in Transkei are as follows:—Tsomo, Xalanga, Mount Fletcher, Matatiele

# Importation of Live Stock.

RETURN showing particulars of certain Pure-Bred Live Stock recently imported into the Union of South Africa.

| Stud-book No. or Name | Breed and Stud-book in which Registered. | Sex. | Country of Origin. | Importer's Name and Address |
|---|---|---|---|---|
| HORSES: | | | | |
| No. 40 ... ... ... | Thoroughbred.—English Stud-book, vol 21, page 567... | Mare | England | H. L. du Toit, Honey Nest Kloof, C.P. (24/6/13). |
| "Evening Glow" ... ... | No particulars ... ... ... ... ... ... | " | U K | Jack White, Plumstead (16/5/13). |
| "Highland Laird," No. 16633 | Clydesdale.—Stud-book, vol. 34 ... ... ... ... | Stallion | " | Messrs McKee & Co., Pokwani, Dist. Vryburg (2/6/13). |
| "Scott Wyllie," No. 17056 | " " " 35 ... ... ... ... | " | " | " " " |
| No particulars ... ... | Thoroughbred.—English, vol. 22... ... ... ... | Mare | " | Arthur Meikle & Co., 101 Fox St., Jo'burg. |
| " ... ... | " " " 22... ... . ... | " | " | " " " |
| " ... ... | " " " 21... ... ... ... | " | " | " " " |
| " ... ... | " " " 21... ... ... ... | Stallion | " | " " " |
| CATTLE: | | | | |
| No. 22916 ... ... ... | Red Poll.—Red Poll Herd-book ... ... ... ... | Heifer | England | C. W. Champion, Bloemfontein (24/6/13). |
| No. 22987 ... ... ... | " " " ... ... ... ... | " | " | " " " |
| No. 22517 ... ... ... | " " " ... ... ... ... | " | " | " " " |
| No. 22921 ... ... ... | " " " ... ... ... ... | " | " | " " " |
| No. 22924 ... ... ... | " " " ... ... ... ... | " | " | " " " |
| No. 22923 ... ... ... | " " " ... ... ... ... | " | " | " " " |
| No. 22929 ... ... ... | " " " ... ... ... ... | " | " | " " " |
| No. 22931 ... ... ... | " " " ... ... ... ... | Bull | " | " " " |
| "Barteliver Robber," No 110950 | Shorthorn.—Shorthorn Society ... ... ... ... | " | " | Wm. Hoskin. Transvaal (27/6/13). |
| "Bidgeburg Boxer," ... | " Red Shorthorn Association, vol. 19 ... | " | G. Britain | Sir David Graaff, Bart., Capetown (2/6/13). |
| No particulars ... ... | " Coates' Herd-book, vol 59... ... ... | " | Scotland | H. Lamont, Aliwal North (1/7/13). |
| "Westward Ho" ... ... | " " " . ... ... ... | " | " | " " (5/6/13). |
| No. 21338 ... ... ... | " Shorthorn Society of Gt. Britain (Export.) | Heifer | U.K. | S. B. Woollatt, Stangers Hoek, Mooi River, Ntl. |
| No. 21337 ... ... ... | " " " " | " | " | " " " |
| No. 21335 ... ... ... | " " " " | " | " | " " " |
| No. 21333 ... ... ... | " " " " | " | " | " " " |
| No 21340 ... ... ... | " " " " | " | " | " " " |

| | | | | |
|---|---|---|---|---|
| No particulars ... ... | Shorthorn.—Shorthorn Herd-book ... ... ... | Bull | U.K. | R. Abbot, Mooi River, Natal (4/6/13). |
| „ ... ... | „ „ „ ... ... ... | „ | „ | „ „ „ |
| No. 108261 ... ... ... | „ Coates' Herd-book, vol. 57, page 109 ... | „ | „ | A. P. May, Stagstones, Rosetta. Natal (11/6/13). |
| No particulars (5 animals) | „ „ „ vols. 57, 58, 59 ... | Heifers | „ | „ „ „ |
| No particulars (5 animals) | „ Shorthorn Society of U.K.... ... ... | Bulls | „ | Holmes & Co., 11 Club Arcade, Durban. |
| No particulars (3 animals) | „ „ „ „ vol. 58, page 381 | Heifers | „ | „ „ „ |
| No. 21396 ... ... ... | „ „ „ „ ... ... ... | Bull | „ | Heenan Bros., Rosetta, Natal (12/6/13). |
| No. 21397 ... ... ... | „ „ „ „ ... ... ... | „ | „ | „ „ „ |
| No. 21398–42 (5 animals) | „ „ „ „ ... ... ... | Heifers | „ | „ „ „ |
| No particulars (2 animals) | „ Coates' Herd-book Society, vol. 59 ... | Bulls | „ | S. B. Woollatt, Mooi River, Natal (14/6/13). |
| No particulars (2 animals) | „ „ „ „ vols. 57 and 60 | Cows | „ | „ „ „ |
| No particulars ... ... | „ „ „ „ ... ... ... | Heifer | „ | „ „ „ |
| „ ... ... | „ Shorthorn Society, vol. 58 ... ... ... | Bull | „ | J. G. Phipps, Willow Grange. |
| "Demora Victory" (Cert. No. 2056) | Aberdeen-Angus.—Aberdeen-Angus Cattle Soc., vol. 38 | „ | England | David McCall, Zeerust, Transvaal (27/6/13). |
| "Elmsdale of Aldbar" (Cert. No. 2057) | „ „ „ „ | „ | „ | „ „ „ |
| No. 2016 ... ... ... | „ „ „ „ | Heifer | U.K. | E. E. Sturges, Bethal. |
| No. 2017 ... ... ... | „ „ „ „ | „ | „ | „ „ |
| No. 2018 ... ... ... | „ „ „ „ | „ | „ | „ „ |
| No. 2019 ... ... ... | „ „ „ „ | „ | „ | „ „ |
| No. 2020 ... ... ... | „ „ „ „ | „ | „ | „ „ |
| No. 2049 ... ... ... | „ Aberdeen-Angus Cattle Book ... | Bull | „ | W. Pirie, Welgelegen, Transvaal (12/6/13). |
| No. 2050 ... ... ... | „ „ „ ... | Heifer | „ | „ „ „ |
| No. 29408 ... ... ... | Ayrshire.—Ayrshire Cattle Herd-book, vol. 35... ... | „ | „ | R. H. Ireland. Pretoria (2/6/13). |
| No. 23127 ... ... ... | „ „ „ „ 36... .. | „ | „ | „ „ „ |
| No. 26347 ... ... ... | „ „ „ „ 34 .. ... | „ | „ | „ „ „ |
| No. 31312 ... ... ... | „ „ „ „ 36... ... | „ | „ | „ „ „ |
| No. 32976 ... ... ... | „ „ „ „ 36... ... | „ | „ | „ „ „ |
| No. 8905 ... ... ... | „ „ „ „ 35... ... | Bull | „ | „ „ „ |
| No. 9694 ... ... ... | „ Ayrshire Cattle Book ... ... ... | „ | „ | W. McFie, Highlands, Natal (18/6/13). |
| No. 9728 ... ... ... | „ „ „ ... ... ... | „ | „ | „ „ „ |
| No. 9763 ... ... ... | „ „ „ ... ... ... | „ | „ | „ „ „ |
| No. 8292 ... ... ... | „ Ayrshire Cattle Herd-book, vol. 34... ... | „ | „ | Henry Wilson, Bethal, Transvaal. |
| No. 3916 ... ... ... | Hereford.—Herefordshire Herd-book Society ... ... | „ | „ | Reynolds Bros., Cedarmont, Transvaal (10/6/13). |
| No. 3917 ... ... ... | „ „ „ „ ... ... | „ | „ | „ „ „ |

| Stud-book No. or Name. | Breed and Stud-book in which Registered. | Sex. | Country of Origin. | Importer's Name and Address |
|---|---|---|---|---|
| CATTLE (*continued*): | | | | |
| No. 224 ... ... ... | South Devon.—South Devon Herd-book Society ... | Bull | U.K. | Mitchell-Innes & Co., Elandslaagte, Natal (10/6/13). |
| No. 8562 ... ... ... | " " " " ... | Cow | " | Col. E. M. Greene, Springgrove, Nottingham Road, Natal (10/6/13). |
| No. 10119 ... ... ... | " " " " ... | " | " | " " " |
| No. 10489 ... ... ... | " " " " ... | " | " | " " " |
| No particulars (2 animals) | " " " " ... | Heifers | " | " " " |
| No particulars ... ... | " " " " vol. 13 | Bull | " | W. J. Slatter, Greytown, Natal (14/6/13). |
| " ... ... | " " " " " 11–14 | " | " | " " " |
| No. 7860 ... ... | Devon.—Devon Cattle Society Herd-book, vol. 36 ... | " | " | Thos. Maxwell, Waschbank, Natal (11/6/13). |
| No. 25001 ... ... ... | " " " " ... ... | Heifer | " | " " " |
| No. 25002 ... ... ... | " " " " ... ... | " | " | " " " |
| No. 112034 ... ... ... | Cornish ... ... ... ... ... ... ... | Bull | " | A. Sclanders, Kelvin, Glenisla, Natal (12/6/13). |
| No particulars (5 animals) | Friesland.—Vereeniging Het Friesch Rundvee Stamboek | Bulls | Holland | Agric. Co-operative Union, Pietermaritzburg (19/6/13). |
| No particulars (2 animals) | " " " " | Cows | " | " " " |
| SHEEP: | | | | |
| No. 013898 R. ... ... | Shropshire.—English Shropshire Stock-book ... ... | Ram | U.K. | H. Hosking, Rosetta, Natal. |
| No. 013899 R. ... ... | " " " " ... ... | " | " | " " |
| No. 013900 E. ... ... | " " " " ... ... | Ewe | " | " " |
| No. 013901 E. ... ... | " " " " ... ... | " | " | " " |
| No. 013902 E. ... ... | " " " " ... ... | " | " | " " |
| No particulars (10 animals) | Tasmanian.—Stud-book, vol 36–44 ... ... ... | Rams | Tasmania | J. W. Sephton, E. Griqualand (7/6/13). |
| PIGS: | | | | |
| "Mooicroft Pioneer," No. 16940 | Berkshire ... ... ... ... ... ... ... | Boar | U.K. | W. Harries, Somerset West. C.P. (3/6/13). |
| "Joy," No. 16938 ... ... | " ... ... ... ... ... ... ... | Sow | " | " " " |
| "Delight," No. 16939 ... | " ... ... ... ... ... ... ... | " | " | " " " |

# Export of Fruit.

THE following statement shows the description and declared value of fresh fruit exported from the Union of South Africa during the month of June, 1913, distinguishing port of shipment :—

| Description. | Via Capetown. | Via Port Elizabeth. | Via East London. | Via Durban | Via Delagoa Bay. | TOTAL. |
|---|---|---|---|---|---|---|
| | £ | £ | £ | £ | £ | £ |
| Apples ... ... ... | 110 | — | — | 9 | — | 119 |
| Apricots ... ... ... | — | — | — | — | — | — |
| Bananas ... ... ... | 34 | — | — | 45 | — | 79 |
| Grapes ... .. ... | 24 | — | — | — | — | 24 |
| Guavas ... ... ... | — | — | — | — | — | — |
| Lemons ... ... ... | 9 | — | — | 7 | — | 16 |
| Mangoes ... ... ... | — | — | | — | — | — |
| Melons ... ... ... | — | — | — | — | — | — |
| Naartjes ... ... ... | 166 | — | — | 227 | — | 393 |
| Nectarines ... ... | — | — | — | — | — | — |
| Oranges ... ... ... | 1,008 | 92 | — | 102 | — | 1,202 |
| Paw-paws ... ... ... | — | — | — | 12 | — | 12 |
| Peaches ... ... ... | — | — | — | — | — | — |
| Pears ... ... ... | 80 | — | — | 16 | — | 96 |
| Pineapples ... ... | 17 | — | - | 76 | — | 93 |
| Plums ... ... ... | 3 | — | — | — | — | 3 |
| Other kinds ... ... | 1 | — | — | — | — | — |
| TOTAL ... £ | 1,452 | 92 | — | 494 | — | 2,038 |

Statistical and Audit Office,
22nd July, 1913.

# Departmental Notices.

## TOBACCO SEED.

The Tobacco and Cotton Division has a quantity of selected and acclimatized tobacco seed of heavy and bright types for distribution during 1913. All applications for seed must be sent to the Chief of the Tobacco and Cotton Division, P.O. Box 516, Pretoria, accompanied by postal orders to cover cost of same.

This seed will be distributed pro ratio at a charge of 1s. per oz.

*Turkish Tobacco Seed:* The following varieties of Turkish seed can be obtained from the Officer in Charge of Turkish Tobacco Experiments, Stellenbosch, Cape Province, at the prices quoted, viz.:—

| | |
|---|---|
| Soulook ................................... | 4s. per oz. |
| Malcadje................................... | 4s. „ |
| Baladovari................................. | 4s. „ |
| Dubeck ..................................... | 5s. „ |

W. H. SCHERFFIUS,
*Chief of Tobacco and Cotton Division.*

## CLEANING AND GRADING TOBACCO SEED.

The Tobacco and Cotton Division, Union Department of Agriculture, Pretoria, are prepared to clean and grade tobacco seed sent to them by farmers free of charge.

The process separates the light from the heavy seed, and the result is that a much larger percentage of the cleaned seed will germinate.

W. H. SCHERFFIUS,
*Chief of Tobacco and Cotton Division.*

## COTTON SEED.

Selected seed of several varieties of American Upland Cotton can be obtained from the Tobacco and Cotton Division, Union Department of Agriculture, Pretoria, at a charge of 3d. per lb.

In every case a remittance must accompany the order for seed.

W. H. SCHERFFIUS,
*Chief of Tobacco and Cotton Division.*

## VETERINARY RESEARCH LABORATORY, ONDERSTEPOORT.

### ADMISSION OF VISITORS.

It is hereby notified for the information of the public that visitors cannot be admitted to the Veterinary Research Laboratory at Onderstepoort during working hours on weekdays unless a special permit has previously been obtained from the Secretary for Agriculture.

The most convenient time for visitors to be shown over the Laboratory is Sunday afternoon, when an officer will be specially detailed for the purpose and permits will not be required.

## PIGS FOR SALE.

Large White, Yorkshire, and Berkshire Pigs are for sale from the Tweespruit Stud Farm, P.O. Tweespruit, and Large Blacks and Berkshires from the Roodepoort Stud Farm, P.O. Dewetsdorp. Inquiries should be addressed to the Managers of the farms mentioned.

## GOVERNMENT WINE FARM, GROOT CONSTANTIA.

### VISITORS' DAYS.

It is notified by the Secretary for Agriculture that it has been decided that persons shall be allowed to visit the Government Wine Farm at Groot Constantia between the hours of 9 a.m. and 5 p.m. on Mondays, Tuesdays, and Thursdays.

## EXPERIMENT FARM, CEDARA.

### PURE-BRED POULTRY AND SITTINGS OF EGGS FOR SALE.

Cockerels of the following breeds are now available for sale from the Cedara Experiment Farm, Natal:—

Plymouth Rock, White Wyandotte, White Leghorn, and Buff Orpington, 7s. 6d. to 15s. each, f.o.r. buyer's nearest station (in Natal only) at buyer's risk.

Sittings of eggs from Plymouth Rock, White Wyandotte, English and American White Leghorns, Buff and White Orpingtons, and Indian Game fowls, will be for sale during September and October at 10s. per sitting f.o.r. buyer's nearest station (in Natal only). Guaranteed fertile on dispatch, and will be replaced only if returned, carriage paid, in box in which originally dispatched from Cedara. Egg-boxes charged 6d. each.

Applications to be made to the Principal, School of Agriculture, Cedara, Natal.

## DEPARTMENT OF AGRICULTURE LIBRARY.

### LIST OF COMPLETE WORKS ACQUIRED DURING JUNE, 1913.

Bastable, C. F.—"Public Finance." London, 1903.
Blackie & Sons.—"The Agriculturist's Calculator." London, 1911.
Boddard, F. E.—"Earthworms and their Allies." Cambridge 1912.
Bonney, T. G.—"The Work of Rain and Rivers." Cambridge, 1912.
Bradley, F. A.—"Pumping and Water Power." London, 1912.
Cole, G. A. J.—"Rocks and their Origins." Cambridge, 1912.
Comstock, Anna B.—"How to keep Bees." New York, 1909.
Curtis, C. H.—"Annuals, Hardy and Half-hardy." London, 1912.
Gibault, M. G.—"Histoire des Légumes." Paris, 1912.
Gordon, Geo.—"Dahlias." London, 1912.
Hammond, J. L. & B.—"The Village Labourer, 1760-1832." London, 1912.
Howitt, C. G.—"House-flies and How they Spread Disease." Cambridge, 1912.
Jacob, Rev. J.—"Tulips." London, 1912.
Wright, Sir A. R.—"Handbook of the Technique of the Teat and Capillary Glass Tube." London, 1912. (Deposited with the Plant Pathologist.)

## DIVISION OF SHEEP.

B. G. L. Enslin, Chief of the Division of Sheep, Box 1251, Pretoria.
A. G. Davison, Principal Sheep Inspector, Box 1251, Pretoria.

*Senior Sheep and Wool Experts:*

C. Mallinson, P.O. Box 1251, Pretoria.
J. F. McNab, Bloemfontein, O.F.S.

*Sheep and Wool Experts:*

E. V. Goddefroy, Worcester, Cape Province.
J. J. McCall, Cedara, Natal.
W. McKee, Queenstown, Cape Province.
R. B. Pickles, Government Stud Farm, Ermelo, Transvaal.
A. M. Spies, P.O. Potchefstroom, Transvaal.
A. V. M. Suter, Bloemfontein, Orange Free State.
P. S. Taylor, Steynsburg, Cape Province.

*Senior Sheep Inspectors in the Cape Province:*

W. L. Currie, C.M.G., Atherstone, P.O. Grahamstown.
H. F. Brown, Umtata.
W. Cronwright, Hanover.
P. J. de Wet, Hopefield, Griquatown.
P. J. de Wet, Beaufort West.
F. P. Fincham, Roydon, Queenstown.
J. C. Froneman, Indwe.
F. J. Fuller, Engcobo.
S. Keightley, Bedford.

B. S. King, Maclear.
H. A. van der Merwe, Prieska.
W. J. van der Merwe, New Bethesda.
G. Venter, Mafeking.
P. A. Steenekamp, Garies, Namaqualand.
C. A. Wilson, Ceres.

*Senior Sheep Inspectors in the Province of the Transvaal:*

C. J. Brits, P.O. Platrand Station, District Standerton.
F. P. J. Jacobsz, P.O. Potchefstroom.
P. R. Viljoen, P.O. Heidelberg.

*Senior Sheep Inspectors in the Orange Free State:*

T. H. Cousins, P.O. Hammonia, via Ficksburg.
D. S. Lubbe, Jacobsdal.
George Murray, Vrede.

*Senior Sheep Inspectors in the Province of Natal:*

J. C. Emmett, Gobeni, Vryheid.
H. J. Blignaut, Assistant Senior Inspector, Newcastle.

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## LIST OF SCAB INSPECTORS OF THE UNION.

### I.—CAPE PROVINCE.

*ABERDEEN—*
D. van Rensburg, Sheep Inspector, Aberdeen.

*ALBANY—*
W. L. Currie, C.M.G., Senior Sheep Inspector, Atherstone Station.
E. A. Smith, Sheep Inspector, Vaalkrantz, Grahamstown.

*ALICE—*
W. Dewey, Sheep Inspector, Alice.

*ALEXANDRIA AND BATHURST—*
V. Rippon, Sheep Inspector, Highlands, near Grahamstown

*ALIWAL NORTH—*
T. J. Steenekamp, Sheep Inspector, Aliwal North.
H. F. Oelschig, Sheep Inspector, Lady Grey.
P. J. Naude, Sheep Inspector, Lady Grey.
J. Venter, Sheep Inspector, Aliwal North.

*ALBERT—*
W. H. Lategan, Sheep Inspector, Burghersdorp.
E. E. Webster, Sheep Inspector, Venterstad.
H. Versfeld, Sheep Inspector, Burghersdorp.

*BARKLY EAST—*
C. Albertyn, Sheep Inspector, Barkly East.
M. T. Benson, Sheep Inspector, Rhodes.
H. Church, Sheep Inspector, Lisburn, Barkly Pass.
J. Tennant, Sheep Inspector, Barkly East.

*BARKLY WEST—*
A. J. Brown, Sheep Inspector, P.O. Spitzkop, via Klipdam.
W. Perry, Sheep Inspector, Pienaarsfontein, Klein Boetsap.

*BEDFORD—*
E. J. Frames, Sheep Inspector, Bedford.
S. Keightley, Senior Sheep Inspector, Bedford.

*BREDASDORP—*
J. H. Human, Sheep Inspector, Ruggens, via Napier.

*BEAUFORT WEST*—
P. J. de Wet, Senior Sheep Inspector, Beaufort West.
P. C. Minnaar, Sheep Inspector, Midlands, Slangfontein, Beaufort West.
P. J. L. Pienaar, Sheep Inspector, Beaufort West.
J. R. M. van Huyssteen, Sheep Inspector, Merweville, Prince Albert Road.

*BRITSTOWN AND PHILIPSTOWN*—
J. A. Grove, Sheep Inspector, Britstown.
R. E. van der Merwe, Sheep Inspector, De Aar.
C. W. Webster, Sheep Inspector, Philipstown.

*BIZANA*—
J. A. D. Leslie, Sheep Inspector, Bizana, Pondoland.

*BUTTERWORTH*—
A. E. Boyce, Sheep Inspector, Butterworth, Transkei.
J. A. Stratford, Sheep Inspector, The Springs, Ndabakazi, via Butterworth.

*CALEDON*—
C. F. Albertyn, Sheep Inspector, Caledon.

*CALVINIA*—
J. Louw, Sheep Inspector, Calvinia.
C. Mollet, Sheep Inspector, Calvinia.
W. J. Pelser, Sheep Inspector, Brandvlei, Calvinia.
W. S. van der Merwe, Sheep Inspector, P.B. Calvinia.

*CAPE (including Paarl and Stellenbosch)*—
J. A. Louw, Sheep Inspector, Eikenboom, Hermon.
W. J. Smuts, Senior Sheep Inspector, Bellville.

*CARNARVON*—
P. L. Avenant, Sheep Inspector, Van Wyk's Vlei.
E. Botha, Sheep Inspector, Carnarvon.
D. S. van der Westhuizen, Sheep Inspector, P.O. Request. Carnarvon.
J. G. de Witt, Sheep Inspector, Carnarvon.

*CERES*—
C. du Toit, Sheep Inspector, De Keur, Ceres.
C. A. Wilson, Senior Sheep Inspector, Ceres

*CATHCART*—
C. C. Froneman, Sheep Inspector, Thomas River.

*CLANWILLIAM*—
G. S. Maas, Sheep Inspector, Graafwater Station.
J. G. van Dyk, Sheep Inspector, Bidouw, Clanwilliam.

*COLESBERG*—
T. B. Vos, Sheep Inspector, Colesberg.

*CRADOCK*—
H. S. J. Kruger, Sheep Inspector, Cradock.
W. Lombard, Sheep Inspector, Cradock.
J. P. du Plessis, Sheep Inspector, Portje, Kareefontein, Cradock.

*COFIMVABA (TEMBULAND)*—
H. L. van Vuren, Sheep Inspector, Cofimvaba, Tembuland.

*ELLIOT*—
H. S. Venter, Sheep Inspector, Elliot, Tembuland
J. D. H. Bredin, Sheep Inspector, P.O. Ida, Elliot.

***ELLIOTDALE***—
W. Fronemann, Sheep Inspector, Elliotdale, Tembuland.

*ENGCOBO*—

C. H. Brent, Sheep Inspector, Engcobo, Tembuland.
F. J. Fuller, Senior Sheep Inspector, Engcobo.
O. T. Hart, Sheep Inspector, P.O. Goghlan, via Clarkebury, Engcobo.
H. E. Hart, Sheep Inspector, Nkwenkwana, Clarkebury, Tembuland.

*FORT BEAUFORT (including Stockenstroom)*—

L. J. Nel, Sheep Inspector, Seymour.
C. R. Wessels, Sheep Inspector, Adelaide.

*FRASERBURG*—

F. Mackey, Sheep Inspector, Williston.
C. F. Klem, Sheep Inspector, Fraserburg.
D. van Schalkwyk, Sheep Inspector, Fraserburg.
W. Wilson, Sheep Inspector, Williston.

*FLAGSTAFF*—

A. Burmeister, Sheep Inspector, Flagstaff, Pondoland.

*GORDONIA*—

J. H. Davies, Sheep Inspector, Upington.
A. F. Mouton, Sheep Inspector, Zwartmodder, Upington.

*GLEN GREY*—

R. J. Boyce, Sheep Inspector, Ennismore, Lady Frere.
W. C. Maytham, Sheep Inspector, Lady Frere.
J. Temlett, Sheep Inspector, Bolotwa.

*GRAAFF-REINET*—

C. J. Goedhals, Sheep Inspector, Graaff-Reinet.
C. Ochse, Sheep Inspector, New Bethesda.
W. J. van der Merwe, Senior Sheep Inspector, New Bethesda.

*HANOVER*—

W. Cronwright, Senior Sheep Inspector, Hanover.
C. J. du Plessis, Sheep Inspector, Hanover.
C. O. B. Smith, Sheep Inspector, Hanover.

*HAY*—

W. H. Smith, Sheep Inspector, Griquatown.
P. J. de Wet, Senior Sheep Inspector, Griquatown.
D. J. van der Merwe, Sheep Inspector, Ossa, Matzap.
H. P. v. d. Westhuizen, Sheep Inspector, Griquastad.

*HERBERT*—

E. H. Cawood, Sheep Inspector, Schmidtsdrift, Herbert.
C. Roberts, Sheep Inspector, Belmont.

*HERSCHEL*—

S. J. Steenekamp, Sheep Inspector, Herschel.
W. H. van Zyl, Sheep Inspector, Herschel.

*HOPETOWN*—

P. J. Badenhorst (B.'s son), Sheep Inspector, Strydenburg, via Krankuil.
L. J. de Jager, Sheep Inspector, Brakvlei, Hopetown.

*HUMANSDORP* (*see Knysna*)

*IDUTYWA*—

F. J. Cavanagh, Sheep Inspector, Idutywa, Transkei.
W. H. Gerber, Sheep Inspector, Idutywa, Transkei.

*JANSENVILLE*—

A. B Slabbert, jun., Sheep Inspector, Jansenville
P. Wolmarans, Sheep Inspector, Uitkyk, Jansenville.

*KENHARDT—*
D. J. Botes, Sheep Inspector, Hartebeeste River Mond, Kenhardt.
P. J. Gouws, Sheep Inspector, Hartebeeste Rivier Mond, via Soetsap, District Kenhardt.
H. C. van Niekerk, Sheep Inspector, Bosduif, P.O. Kenhardt
C. P. Wolhuter, Sheep Inspector, P.O. Rozynenbosch, District Kenhardt.

*KIMBERLEY—*
H. R. le Riche, Sheep Inspector, Modder River Station.

*KNYSNA (including Humansdorp)—*
J. H. Louwrens, Senior Sheep Inspector, Humansdorp.
P. L. Swart, Sheep Inspector, Humansdorp.

*KINGWILLIAMSTOWN—*
G. O. Brown, Sheep Inspector, Blaney Junction.
A. J. Kettles, Sheep Inspector, Middeldrift.
D. Kettles, Sheep Inspector, The Reserve, Kingwilliamstown.
G. F. Newey, Sheep Inspector, Blaney Junction.
A. D. Thompson, jun., Sheep Inspector, Berlin.

*KOMGHA—*
A. J. B. Wessels, Komgha.

*KURUMAN—*
M. J. Holmes, Sheep Inspector, Kuruman.
J. J. Marais, Sheep Inspector, P.O. Dingle, Kuruman.

*KENTANI—*
J. B. Macready, Sheep Inspector, Kentani, Transkei.

*KOKSTAD—*
T. P. Orford, Sheep Inspector, Kokstad, Griqualand East.

*LADISMITH—*
M. P. Wilsnach, Sheep Inspector, Ladismith.

*LAINGSBURG (see Worcester)*

*LIBODE—*
T. Adams, Sheep Inspector, Libode, Pondoland.

*LUSIKISIKI—*
G. D. Petrie, Sheep Inspector, Lusikisiki, Pondoland.
C. Brent, Sheep Inspector, Lusikisiki, Pondoland.

*MAFEKING—*
C. E. Betts, Sheep Inspector, Mafeking
D. F. Enslin, Sheep Inspector, P.O. Setlagoli, via Maribogo.
G. Venter, Senior Sheep Inspector, Mafeking.

*MACLEAR—*
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A. Harris, Sheep Inspector, Antelope Park, Maclear, Griqualand East.
B. S. King, Senior Sheep Inspector, Maclear.
P. F. Theron, Sheep Inspector, Ugie, Maclear.
G. Pretorius, Sheep Inspector, Mxaza, Maclear, Griqualand East.

*MATATIELE—*
A. N. Elliot, Sheep Inspector, Cedarville, Matatiele.
N. McNeill, Sheep Inspector, Matatiele, Griqualand East.
J. F. Zietsman, Sheep Inspector, Tharfield, P.O. Matatiele.

*MALMESBURY—*
M. Smuts, Sheep Inspector, Bloemfontein, Malmesbury.
C. Duckitt, Sheep Inspector, Darling.

*MARAISBURG—*
C. J. F. Botha, Sheep Inspector, Maraisburg.

*MIDDELBURG—*
J. L. Coetzee, Sheep Inspector, Middelburg.
R. P. de Wet, Rosmead Junction, Middelburg.

*MOLTENO—*
C. A. Olivier, Sheep Inspector, Molteno

*MONTAGU (see Robertson).*

*MOSSEL BAY—*
W. A. O'Shea, Sheep Inspector, Mossel Bay.

*MURRAYSBURG—*
C. R. van Heerden, Sheep Inspector, Murraysburg.

*MQANDULI—*
F. Sutton, Sheep Inspector, Mqanduli, Tembuland.
H. McGregor, Sheep Inspector, Mqanduli, Tembuland.

*MOUNT AYLIFF—*
F. W. Keightley, Sheep Inspector, Mount Ayliff, Griqualand East.

*MOUNT CURRIE—*
J. A. Naude, Sheep Inspector, P.O. New Amalfi, Mount Currie.

*MOUNT FLETCHER—*
W. Hack, Sheep Inspector, Mount Fletcher, Griqualand East.
C. Thomas, Sheep Inspector, Kenegha Drift, Griqualand East.

*MOUNT FRERE—*
W. T. Futter, Sheep Inspector, Mount Frere, Griqualand East.
C. Shaw, Sheep Inspector, P.O. Mondeleni, Mount Frere.
C. Streatfield, Sheep Inspector, Sugar Bush, Griqualand East.

*NAMAQUALAND—*
J. H. Burke, Sheep Inspector, Klipvlei, Garies, Namaqualand.
R. J. Dixon, P.O. Pella, Namaqualand.
G. Dixon, Sheep Inspector, Garies, P.O. Springbok.
L. Hornemann, Sheep Inspector, P.O. Springbok, Namaqualand.
E. Loynes, Sheep Inspector, P.O. Kamaggas, Namaqualand

*NQAMAKWE—*
E. W. Hall, Sheep Inspector, Nqamakwe, Transkei.
C. R. Moore, Sheep Inspector, Nqamakwe, Transkei

*NGQELENI—*
G. S. Behrens, Sheep Inspector, Ngqeleni, Pondoland.

*OUDTSHOORN—*
A. J. Strydom, Sheep Inspector, Regent Street, Oudtshoorn.

*PAARL (see Cape).*

*PEARSTON—*
C. F. Goedhals, Sheep Inspector, Pearston.

*PEDDIE—*
H. W. Glass, Sheep Inspector, Peddie.
W. Hill, Sheep Inspector, Peddie.

*PHILIPSTOWN (see Britstown).*

*PIQUETBURG (including Tulbagh)—*
H. de Clercq, Sheep Inspector, Porterville.
G. J. Smit, Sheep Inspector, Private Bag, Osdam, Piquetberg.

*PORT ELIZABETH*—
J. J. Berry, Sheep Inspector, corner of Glen and Stanley Streets, Port Elizabeth.

*PRIESKA*—
R. A. Dodds, Sheep Inspector, Zoutvlei, Omdraai's Vlei.
L. J. Duncker, Sheep Inspector, Prieska.
C. W. F. Jeppe, Sheep Inspector, Brakboschpoort, Marydale, Prieska.
J. C. Scholtz, Sheep Inspector, P.O. Koegasput, Prieska.
H. A. van der Merwe, Senior Sheep Inspector, Prieska.
G. J. van Niekerk, Sheep Inspector, Prieska.

*PRINCE ALBERT*—
J. G. le Roes. Sheep Inspector, Kareekraal, Prince Albert Road.
G. C. Mulder, Sheep Inspector, Prince Albert.

*QUEENSTOWN*—
G. W. R. Aspeling, Sheep Inspector, Queenstown.
S. Barnes, Sheep Inspector, Oxton, Whittlesea.
F. P. Fincham, Senior Sheep Inspector, Queenstown.
M. J. Lotter, Sheep Inspector, Sterkstroom.

*QUMBU*—
W. Burmeister, Sheep Inspector, Qumbu.
R. W. Rutters, Sheep Inspector, Qumbu, Griqualand East.

*QUMANCO*—
J. A. de Wet, Sheep Inspector, c/o W. J. Snodgrass, Qumanco, P.O. Main Tembuland.

*RICHMOND*—
B. J. Burgers, Sheep Inspector, Richmond.

*RIVERSDALE*—
M. J. la Grange, Sheep Inspector, Riversdale.

*ROBERTSON*—
J. T. Malherbe, Sheep Inspector, Klaasroogdsfontein, Robertson.

*STELLENBOSCH* (*see Cape*).

*STOCKENSTROOM* (*see Fort Beaufort*)

*SOMERSET EAST*—
W. G. Jordaan, Sheep Inspector, Hope Vale, Private Bag, Somerset East.
R. C. Currie, Sheep Inspector, Saltaire Station.
P. B. Botha, Sheep Inspector, Somerset East.

*STEYNSBURG*—
H. F. Cawood, Sheep Inspector, Steynsburg.

*STEYTLERVILLE*—
J. Kilian, jun., Sheep Inspector, Gertskraal, via Steytlerville.

*SUTHERLAND*—
R. C. Olckers, Sheep Inspector, Sutherland.
A. G. van der Westhuizen, Sheep Inspector, Sutherland.

*STUTTERHEIM*—
H. R. Kettles, Sheep Inspector, Dohne Station, Stutterheim.

*ST. JOHN*—
H. C. Treadway, Sheep Inspector, P.O. Insimbina, via Umtata.

*SOUTHEYVILLE*—
A. T. Wylde, Sheep Inspector ,Southeyville, via Lady Frere.

*SWELLENDAM*—
P. J. Uys, Sheep Inspector, Swellendam.
A. S. J. van Rensburg, Sheep Inspector, Stuurmanskraal. Swellendam.

*TAUNGS*—
J. Nieman, Sheep Inspector, Taungs.

*TARKASTAD*—
T. R. Herselman, Sheep Inspector, Tarkastad.
P. W. Venter, Sheep Inspector, Tarkastad.

*TABANKULU*—
E. T. Futter, Sheep Inspector, Tabankulu, Pondoland.
James Usher, Sheep Inspector, Ravenscroft, via Mount Frere. Pondoland.

*TSOLO (GRIQUALAND EAST)*—
E. Peveritt, Sheep Inspector, Tsolo, Griqualand East.
L. Botha, Sheep Inspector, Tsolo, Griqualand East.

*TSOMO (TRANSKEI)*—
E. Deetlefs, Sheep Inspector, Tsomo.
E. A. Smith, Sheep Inspector, Tsomo, Transkei.

*UITENHAGE*—
T. E. Ferreira, Sheep Inspector, Glen Connor.
G. Scheepers, Sheep Inspector, Melkhoutboom, Uitenhage

*UMTATA*—
J. H. Bouwer, Sheep Inspector, Umtata.
H. F. Brown, Senior Sheep Inspector, Umtata.
A. E. Fowler, Sheep Inspector, Umtata, Tembuland.
R. C. Hardwich, Sheep Inspector, Devon Farm, Umtata, Tembuland.
W. McLuckie, Sheep Inspector, Somerset Farm, Umtata, Tembuland.

*UMZIMKULU*—
J. B. Kettles, Sheep Inspector, Sneezewood, Griqualand East.
L. Robinson, Sheep Inspector, Ibisi, via Umzimkulu, Griqualand East.

*UNIONDALE*—
W. H. van der Hoven, Sheep Inspector, Uniondale.

*VAN RHYNSDORP*—
C. L. Brink, Sheep Inspector, Van Rhynsdorp.
J. G. de Bruyn, Sheep Inspector, Van Rhynsdorp.
P. A. Steenekamp, Senior Inspector of Sheep, Van Rhynsdorp.

*VICTORIA WEST*—
Andrew de Klerk, Sheep Inspector, Victoria West.
C. J. van der Merwe, Sheep Inspector, Victoria West.
P. L. Verster, Sheep Inspector, Victoria West.

*VRYBURG*—
J. B. Ramsbottom, Sheep Inspector, c/o Civil Commissioner, Vryburg.
D. P. Schutte, Sheep Inspector P.O. Geluk, Vryburg.
L. F. Thomas, Sheep Inspector, P.O. Box 27, Vryburg.

*WILLISTON (see Fraserburg).*

*WORCESTER*—
D. S. Botha, Sheep Inspector, Botha's Halt, via Worcester.
J. H. Snyman, Sheep Inspector, P.O. Laingsburg.

*WILLOWMORE*—
J. G. Blignaut, Sheep Inspector, Veerenkraal, via Steytlerville.
G. F. Morgan, Sheep Inspector, Karee River, Willowmore.

*WILLOWVALE*—
F. W. Dobrowski, Sheep Inspector, Willowvale, Transkei.
B. Graham, Sheep Inspector, Willowvale, Transkei.

*WODEHOUSE*—
D. H. Botha, Sheep Inspector, Indwe.
W. R. Cloete, Sheep Inspector, Westerford, Dordrecht.
J. C. Froneman, Senior Sheep Inspector, P.O. Indwe.
P. W. Kruger, Sheep Inspector, Dordrecht.

*XALANGA*—
J. P. Ferreira, Sheep Inspector, Cala, Xalanga, Tembuland.

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## II.—PROVINCE OF NATAL.

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*ALEXANDRA AND IXOPO*—
J. C. Terblanche, Sheep Inspector, Ixopo.

*ALFRED*—
L. Trenor, Sheep Inspector, Harding.

*DUNDEE*—
C. L. Plummer, Sheep Inspector, Dundee.

*GREYTOWN*—
J. R. Cooper, Sheep Inspector, Greytown.

*KLIP RIVER*—
L. Larkan, Sheep Inspector, Helpmakaar.

*LADYSMITH*—
A. P. Craw, Sheep Inspector, Ladysmith.

*MOOI RIVER*—
A. T. Grant, Sheep Inspector, Mooi River.

*NEWCASTLE*—
H. J. Blignaut, Assistant Senior Sheep Inspector, Newcastle.
L. Haveman, Sheep Inspector, Newcastle.
H. van Rooyen, Sheep Inspector, Newcastle.

*NEW HANOVER*—
E. Boast, Sheep Inspector, New Hanover.

*PAULPIETERSBURG*—
G. C. Viljoen, Sheep Inspector, Paulpietersburg.

*PIETERMARITZBURG*—
A. Hair, Sheep Inspector, 274 Bulwer Street, Pietermaritzburg.
J. G. Spiers, Sheep Inspector, Dargle Road.

*UTRECHT*—
G. N. Maritz, Sheep Inspector, P.O. Utrecht.
J. M. de Lange, Sheep Inspector, P.O. Tayside.
L. J. Nel, Sheep Inspector, P.O. Rustverwacht, Utrecht.

*VRYHEID*—
J. C. Emmett, Senior Sheep Inspector, Gobeni, Vryheid.
F. F. Kolbe, Sheep Inspector, Private Bag, Welgevonden, via Vryheid.
J. van Rensburg, Sheep Inspector, Louwsburg.
B. E. A. Rabie, Sheep Inspector, Inyati, P.O. Leeuwnek.

*VICTORIA (including Durban)*—
H. Varty, Sheep Inspector, P.O. Verulam, Victoria.

*WEENEN—*
A. W. H. Hattingh, Sheep Inspector, Koplaagte, Frere Station
C. J. Nel, Sheep Inspector, Bergville.
L. Peniston, Sheep Inspector, P.O. Mooi River.

*ZULULAND—*
M. Ebersohn, Sheep Inspector, c/o Resident Magistrate, Nkandhla.
J. Ralfe, Sheep Inspector, Nongoma.

## III.—TRANSVAAL PROVINCE.

*BARBERTON—*
P. G. Blignaut, Field Cornet, P.O. Barberton.
C. G. de Kock, Acting Field Cornet, P.O. Barberton.
Paul M. Marits, Field Cornet, P.O. Kaapse Hoop, District Barberton.

*BELFAST—*
H. C. de Clercq, Sheep Inspector, Belfast.

*BLOEMHOF—*
A. P. Burgers, Field Cornet, Christiana.
L. E. L. Mussman, Field Cornet, Schweizer Reneke, District Bloemhof.
P. de la Rey Swartz, Field Cornet, Grootdoorns No. 133, P.O. Bloemhof.

*CAROLINA—*
Johannes H. Brink, Field Cornet, P.O. Box 37, Carolina.
J. C. Fourie, Field Cornet, P.O. Bonnefoi Station, District Carolina.
Willem H. de Villiers, Field Cornet, P.O. Box 21, Carolina.

*ERMELO—*
Johannes H. N. Grobler, Field Cornet, P.O. Bankkop, District Ermelo.
Abraham G. Kleynhans, Field Cornet, Vleiplaats, P.O. Brakfontein, District Ermelo.
B. J. Smit, Field Cornet, P.O. Box 5, Ermelo.

*HEIDELBERG—*
Johannes S. Fourie, Field Cornet, Boschfontein, P.O. Heidelberg.
Willem F. Pretorius, Field Cornet, Rietfontein, P.O. Devon Station, via Springs, District Heidelberg.
A. P. van Schalkwyk, Field Cornet, P.O. Meyerton, District Heidelberg.
L. R. J. van Vuren, Field Cornet, P.O. Leeuwspruit, via Balfour, District Heidelberg
P. R. Viljoen, Senior Sheep Inspector, Heidelberg.

*KRUGERSDORP—*
O. A. Oosthuizen, Field Cornet, Box 306, Krugersdorp.
J. H. du Plooy, Sheep Inspector, Krugersdorp.
Frederik J. Potgieter, Field Cornet, Nooitgedacht, P.O. Hekpoort, District Krugersdorp.

*LICHTENBURG—*
Gabriel J. Greef, Field Cornet, P.O. Manana, District Lichtenburg.
J. H. van der Merwe, Field Cornet, P.O. Boschpoort, District Lichtenburg.
Andries P. Visser, Field Cornet, Leeuwpan, P.O. Barberspan District Lichtenburg.

*LYDENBURG—*
H. P. Jansen, Field Cornet, P.O. Krugerspost, District Lydenburg.
Christiaan C. C. Joubert, Field Cornet, P.O. Dullstroom, District Lydenburg.
N. B. Lombard, Field Cornet, P.O. Box 77, Lydenburg.
Jacobus Nieuwenhuize, Field Cornet, Rietfontein, P.O. Boschfontein, District Lydenburg.

*MARICO—*
Daniel L. Botha, Field Cornet, Weltevreden, P.O. Box 97, Zeerust, District Marico.
Willem A. Lombard, Field Cornet, Rietspruit, P.O. Groot-afdeeling, District Marico.
Charles P. Marais, Field Cornet, P.O. Ottoshoop, District Marico.
Lourens van Niekerk, Field Cornet, Doornkraal, P.O. Groot Marico, District Marico.
A. W. de Waal, Field Cornet, Rietpan, P.O. Zwartfontein, Marico.

*MIDDELBURG—*
Josias S. de Kock, Field Cornet, P.O. Leeuwklip, Middelburg.
Gerhardus W. van Niekerk, Field Cornet, Goedehoop, P.O. Vaalkrantz, District Middelburg.
Joachim J. C. van Niekerk, Field Cornet, Doornrug, P.O. Balmoral, District Middelburg.
Christian E. Schutte, Field Cornet, Uitkyk No. 428, P.O. Pokwani, District Middelburg.
Adam J. Willemse, Field Cornet, P.O. Tonteldoos, District Middelburg.

*PIET RETIEF—*
C. L. Engelbrecht, Field Cornet, P.O. Box 52, Piet Retief.
H. Weber, Field Cornet, Bodenstadt, P.O. Bergen, District Piet Retief.

*POTCHEFSTROOM—*
G. H. Davidtz, Field Cornet, P.O. Kraalkop, via Randfontein.
M. C. v. Deventer, Field Cornet, P.O. Vluitfontein, via Randfontein, District Potchefstroom.
C. F. Hendrikz, Field Cornet, Luipaardsvlei, P.O. Box 156, Randfontein.
F. P. J. Jacobsz, sen., Senior Sheep Inspector, Potchefstroom.
P. R. Kock, Field Cornet, Klerksdorp, District Potchefstroom.
Stephanus G. Kriegler, Field Cornet, P.O. Frederikstad, District Potchefstroom.
Daniel J. Ysel, Field Cornet, Elandskuil, P.O. Ventersdorp, District Potchefstroom.

*PRETORIA—*
John G. Jones, Field Cornet, P.O. Hennops River, District Pretoria.
P. C. Minnaar, Field Cornet, Wolvegaten, P.O. Engelbrechtsdrift, District Pretoria.
M. N. Riekert, Field Cornet, Hartebeestpoort, P.O. Rietfontein West, District Pretoria.
J. B. Wolmarans, Field Cornet, Donkerhoek, P.O. Hatherley.
M. J. Schutte, Field Cornet, P.O. Delmas, Pretoria.

*RUSTENBURG—*
George H. W. Behrens, Field Cornet, P.O. Bethanie, District Rustenburg.
J. B. I. Deventer, Field Cornet, Klipgat, P.O. Rooiberg, via Warmbaths, District Rustenburg.
S. P. Kloppers, Field Cornet, Leeuwpaard, P.O. Olifants Hoek, Rustenburg.
Roelof J. P. van Tonder, Field Cornet, Rietfontein, P.O. Brakkloof, District Rustenburg.
P. J. v. der Walt, Field Cornet, P.O. Koster, Rustenburg.

*STANDERTON*—
F. Badenhorst, Sheep Inspector, P.O. Paardekop, District Standerton.
W. H. Boshoff, Field Cornet, P.O. Platrand, District Standerton.
C. J. Brits, Senior Sheep Inspector, P.O. Platrand, Standerton.
G. M. Classen, Field Cornet, Syferfontein, P.O. Val Station, District Standerton.
Petrus J. D. Erasmus, Field Cornet, Groenpunt, P.O. Box 63, Bethal, District Standerton.
Adam Gilfillan, Field Cornet, Dorstfontein, P.O. Onverwacht, Bethal, District Standerton.
Hendrik J. J. van Vuren, Field Cornet, Rietvlei, P.O. Blesbokspruit, District Standerton.

*WAKKERSTROOM*—
L. Badenhorst, Sheep Inspector, Uitgezocht, P.O. Kalkoenkrantz, Amersfoort.
F G. Hiles, Field Cornet, P.O. Wachteenbeetje, District Wakkerstroom.
Christian Burger Pringle, Field Cornet, P.O. Volksrust.
Gabriel M. C. Swart, Field Cornet, c/o Thrysman & Co., Vaalbank, Amersfoort, via Zandspruit Station.

*WATERBERG*—
S. D. J. Jordaan, Field Cornet, P.O. Palala, via Nylstroom, District Waterberg.
Hermanus S. Lombard, Field Cornet, Grootvlei, P.O. Box 21, Nylstroom, District Waterberg.
Daniel P. van Rooyen, Field Cornet, P.O. Potgietersrust (P.O. Box 63), District Waterberg.
Marthines P. van Staden, Field Cornet, P.B. Grootfontein, P.O. Oranjefontein, District Waterberg.
J. P. J. van der Walt, Field Cornet, P.B. Koppie Alleen, via Nylstroom, District Waterberg

*WITWATERSRAND*—
De Beer, Sheep Inspector, P.O. Box 4357, Johannesburg.
J. A. Kieser, Sheep Inspector, P.O. Box 4357, Johannesburg.

*WOLMARANSSTAD*—
Wessel Badenhorst, Field Cornet, Rietpan No. 145, District Wolmaransstad.
S. P. du Toit, Field Cornet, P.O. Leeuwdoorns Station, District Wolmaransstad.

*ZOUTPANSBERG*—
D. G. Brink, Sheep Inspector, Shewas, Zoutpansberg.
Marthinus J. P. Biermann, Field Cornet, Bergplaats, P.O. Mara, District Zoutpansberg.
Jacob C. Boltman, Field Cornet, Korthanie, P.O. Duivelskloof, District Zoutpansberg.
Andries S. D. Erasmus, Field Cornet, Smitsplaats, P.O. Pieterburg, District Zoutpansberg.
Christoffel Hofmeyr, Field Cornet, P.O. Marabastad, District Zoutpansberg.
Ernst L. Marais, Field Cornet, De Diepte, Molsgat, via Pietersburg, District Zoutpansberg.
Pieter W. Moller, Field Cornet, Groblerplaats, P.O. Louis Trichardt, District Zoutpansberg.
S. P. Schutte, jun., Field Cornet, Bergendal, P.O. New Agatha, District Zoutpansberg.
D. J. de Villiers, Field Cornet, Rustfontein, Groot Spelonken, District Zoutpansberg.
Austin W. Wienand, Field Cornet, Laatstehoop, P.O. Smitsdrift, District Zoutpansberg.

## IV.—ORANGE FREE STATE.

*BLOEMFONTEIN—*

E. W. Gardiner, Sheep Inspector, Petrusberg, Cheddar.
P. Kelly, Sheep Inspector, 65 Reitz Street, Bloemfontein.
T. H. Niland, Sheep Inspector, Kaffir River.

*BETHLEHEM—*

J. A. Froneman, Sheep Inspector, Bethlehem.
J. J. Wessels, Sheep Inspector, Bethlehem.

*BETHULIE—*

F. H. Parsons, Sheep Inspector, Trompsburg.
C. R. Wiggill, Sheep Inspector, Bethulie.

*BOSHOF—*

A. W. Benzies, Sheep Inspector, P.O. Talsen, via Christiana.
P. F. Dusing, Sheep Inspector, P.O. Koedoesrand, via Paardeberg.
D. Fourie, Sheep Inspector, Boshof.
P. G. du Plessis, Sheep Inspector, Klein Wolvepan, P.O. Kalkpan, via Boshof.

*BRANDFORT—*

P. Fouche, Sheep Inspector, Brandfort.

*EDENBURG—*

C. F. v. d. Merwe, Sheep Inspector, Edenburg.

*FAURESMITH—*

C. S. Biggs, Sheep Inspector, Whitbourne, via Bethany Village.
H. R. Biggs, Sheep Inspector, Private Bag, Fauresmith.
L. du Plessis, Sheep Inspector, Tweesprong, Fauresmith.

*FICKSBURG—*

T. H. Cousins, P.O. Harmonia, Ficksburg.
J. H. van Rooyen, Sheep Inspector, Fouriesburg, District Ficksburg.
P. H. de Villiers, Sheep Inspector, Ficksburg.

*FRANKFORT—*

W. P. Pohl, Sheep Inspector, Frankfort.
A. Ross, Sheep Inspector, Frankfort.

*HARRISMITH—*

J. A'Bear, Sheep Inspector, Harrismith.
C. J. Cronje, Sheep Inspector, Witzieshoek.
W. G. Earle, Sheep Inspector, Harrismith.
F. J. Thornhill, Sheep Inspector, Rose Cottage, Verkykerskop, Harrismith.
C. A. Willemse, Sheep Inspector, Klip Drift, P.O. Kafferstad, District Harrismith.

*HEILBRON—*

J. C. Botha, Sheep Inspector, Heilbron.
J. L. Villet, Sheep Inspector, Heilbron.

*HOOPSTAD—*

L. Botha, Sheep Inspector, Vergezicht, Hoopstad.
F. Everitt, Sheep Inspector, Hoopstad.
S. D. Weber, Sheep Inspector, Bultfontein, District Hoopstad.

*JACOBSDAL—*
C. Grobbelaar, Sheep Inspector, Jacobsdal.
D. S. Lubbe, Senior Sheep Inspector, Jacobsdal.

*KROONSTAD—*
H. J. Fuller, Sheep Inspector, P.O. Roodewal Station, Kroonstad.
P. Malan, Sheep. Inspector, Kroonstad.
H. S. v. d. Merwe, Sheep Inspector, Bothaville, District Kroonstad.
J. F. Verster, Sheep Inspector, Kroonstad.

*LADYBRAND—*
T. H. Oberholzer, Sheep Inspector, Ladybrand.
W. E. Robinson, Sheep Inspector, Ladybrand.

*LINDLEY—*
W. E. Howse, Sheep Inspector, Lindley.

*PARYS—*
J. Horn, Sheep Inspector, Parys.

*PHILIPPOLIS—*
A J. Swanepoel, Sheep Inspector, Philippolis.

*REITZ—*
J. C. Boshoff, Sheep Inspector, Reitz.

*ROUXVILLE—*
F. L. Fouche, Sheep Inspector, Zastron, District Rouxville.
C. H. Roodt, Sheep Inspector, Rouxville.
H. H. Steyn, Sheep Inspector, Rouxville.

*SENEKAL—*
A. C. McHattie, Sheep Inspector, Senekal.
D. A. Mare, Sheep Inspector, Ventersburg.

*SMITHFIELD—*
P. A. Froneman, Sheep Inspector, Smithfield.
O. D. J. Stuart, Sheep Inspector, Inzicht, via Reddersburg.

*THABA 'NCHO—*
J. Brits, Sheep Inspector, Thaba 'Ncho.
F. W. Morgan, Sheep Inspector, Thaba 'Ncho.
N. Wessels, Sheep Inspector, Thaba 'Ncho.

*VREDE—*
N. J. Grog, Sheep Inspector, Vrede.
Geo. Murray, Senior Sheep Inspector, Vrede.
M. J. Rudolph, Sheep Inspector, Vrede.

*VREDEFORT—*
S. C. Schutte, Sheep Inspector, Vredefort.

*WEPENER—*
T. C Robertson, Sheep Inspector, Wepener.

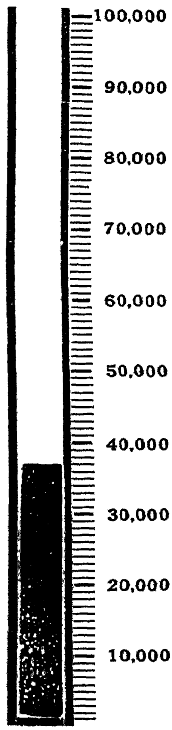
*DEWETSDORP—*
A. E. Butler, Sheep Inspector, Dewetsdorp.

*WINBURG—*
C. P. v. d. Merwe, Sheep Inspector, Ventersburg, District Winburg.
H. F. J. Pretorius, Sheep Inspector, Theunissen.
T. M. S. van Rooyen, Sheep Inspector, Winburg.

# CIRCULATION GAUGE.

**DO YOU READ THE**
***AGRICULTURAL JOURNAL?***

AUGUST, 1913.




**IF NOT,**
**WHY NOT?**

# NOTICE.

The attention of intending settlers is invited to the provisions of Section 11 of the Land Settlement Act, No. 12 of 1912, which reads as follows :—

1. If any such person as in section 19 is described make written application to the Minister—

(a) requesting that certain land specifically mentioned and described by plan or otherwise in the application, be purchased by the Minister for settlement purposes on behalf of the applicant ;

(b) stating the maximum purchase price of the land ;

(c) stating that the applicant is willing to contribute forthwith not less than one-fifth of that maximum purchase price,

the Minister may, with the approval of the Governor-General and subject to the provisions of this Act, purchase the said land.

2. Before completing an agreement for the purchase of land under this section, the Minister shall require the applicant to deposit, or lodge satisfactory security for the payment of, the applicant's share of the purchase price and in determining the amount of that share regard shall be had to the actual purchase price, any modification of the terms and conditions of the application and of any special conditions to be included in the lease to be issued to the applicant as hereinafter provided. Any such modifications of the application shall be in writing signed by the applicant.

3. As soon as the purchase is complete and transfer of the land into the name of the Government has been obtained, the land shall be allotted upon lease to the applicant subject to all the provisions of this Act and at a valuation equal to the aggregate amount of the purchase price, cost of transfer, survey fees, and other expenditure of the Minister in connection with the purchase, transfer, and allotment of the land ;

Provided that—

(a) the right of the lessee to purchase the land as hereinafter provided shall be deemed to have been exercised as from the date of the commencement of the lease ;

(b) the amount contributed by the applicant towards the purchase price as aforesaid shall be considered as a payment by him on account of purchase price and any such half-yearly instalments of principal and interest payable as are hereinafter provided shall be reduced accordingly.

If the holding allotted as in this section provided be forfeited under this Act for any breach of or non-compliance with the provisions thereof or the conditions of the lease, the Minister may in his discretion declare that the whole or any portion of the amount contributed by the applicant towards the purchase price aforesaid be forfeited to the Crown.

Information as to the procedure to be followed in making application under the above-quoted section may be obtained from the Secretary for Lands, Pretoria, from whom also copy of the Land Settlement Act, 1912, may be obtained free.

G. R. HUGHES,
*Secretary for Lands.*

DEPARTMENT OF LANDS,
PRETORIA. *2nd June*, 1913.

30-35

# The Agricultural Journal

## OF THE UNION OF SOUTH AFRICA.

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## Editorial Notes.

The rural portions of the countries affected by agricultural co-operation have been transformed and raised to higher productive efficiency. The agricultural classes and the entire country have grown richer. And the men practising such co-operation have been transmuted as well. There is remarkable educating power in co-operation, which makes men think, calculate, study, and which trains them for business. It quickens the march of civilization, while hastening the growth of population. It sharpens wits and awakens intelligence. We notice the result . . . . in European countries. What is the agriculture of Germany to-day, with its "intensive" culture, its remunerative "industrial" crops, its perfected rotations, its variety of applications? Fifty years ago German agriculture lagged miles behind our own. The burden of the two Stockhardts' and of Hartstein's teaching was: Do like the English and the Scotch! Now, barring live stock breeding—in which we still excel—German agriculture is undoubtedly ahead of ours.—HENRY W. WOLFF (" Co-operation in Agriculture").

**More about Veld-burning.**

In the last issue of the *Journal* we published three further welcome contributions to the discussion of the question of veld-burning in the form of letters from Messrs. C. R. Prances, of Rankin's Pass, Nylstroom; J. J. Claase, Koopmansfontein, Barkly West; and J. P. H. Wink. These letters arrived too late to enable us to comment upon them in our Editorial Notes last month, but they constitute such interesting and useful contributions to the discussion that we may be excused for thus referring to them a month after their publication.

The point that strikes us most in these letters, and one to which we call the particular attention of our Natal readers, is the effect of burning upon the "souring" of the veld. We all know that the grass veld over South Africa is divided up into distinct "sweet" and "sour" areas. It is a phenomenon of our veld that is taken for granted: why there should be sweet veld in some parts and sour in others rarely troubles the farmer. His veld may be sour; the fact is unfortunate, but the fact remains. It never occurs to him that the circumstance is one which it may quite possibly be within his power

to alter; instead, he resigns himself to the fact and makes the best of things by burning every year. The immediate results are good, and he is satisfied that he is doing his best.

What we endeavoured to make clear in our June notes we repeat here; we do not desire to be dogmatic. Let every farmer study the question carefully; let him experiment and see what effect burning has upon sour veld alongside a field left unburned, yet properly grazed. We are not going to lay down dogmatically that the result after a few years will be that sour veld left untouched by fire will be sweetened, but what we would say is this, that everything seems to justify the drawing of such a conclusion.

**Sour Veld and Burning.**

Let us consider the experience of Messrs. Prances and Claase, who wrote on this subject last month, the one a Transvaal farmer, the other farming in the Cape Province. Mr. Prances says:—

> In the middle of my paddocks is a tiny one round my house, about one morgen, and as I do not care for cows in the kitchen, etc., this remains ungrazed mostly and has to be burned. But after five years it is sad stuff; whereas the outer paddocks, grazed to extinction, and for the most part unburned, have in four to five years completely changed their nature. Here and there, looking carefully, you may find the small remains of a tuft of the original sour grass, but the rest is short and sweet. As I said, it begins in bare patches; but in a year or two the sweet grass floods over them.

And Mr. Claase writes:—

> Grass after such a burning is much coarser and also sour. . . . Grass growing on veld not burnt is much sweeter, because the fertile layer of the earth is much better manured, and also kept loose by the particles of manure covering it. . . . To keep one's stock continually in a good condition, the veld ought not to be burnt, because when the grass is about a year old the stock graze very badly; no doubt they do not like the grass, being coarse and sour.

These are but two opinions, it is true, but they are of value as being the result of practical experience, and they serve to confirm our own contention that the practice of grass-burning tends to kill out the better grasses, leaving the hardiest, i.e. the coarsest, to survive. It is a case purely of the survival of the fittest. Delicate plants require, at the very least, natural conditions to enable them to survive and prosper, and the practice of annual burning cannot be described as furnishing natural conditions.

As we said in our last notes on veld-burning, there are isolated cases to be met with, such as in Natal, where conditions do not yet permit of a complete abandonment of veld-firing, but it would be very difficult to say that these conditions are such as not to be in the power ultimately of the farmer to remedy. Consider the matter, for instance, from this point of view: On sour veld it is the practice to burn every year *because the veld is sour*, this affording an easy means of providing a good bite for the stock. But is it not very likely that the veld is sour *because it is burned*? It has always been the practice in Natal, for example, to burn off the veld every year—this having been necessitated by the insufficient number of stock to keep down the growth—and it appears very probable that the sour veld which we now have in that Province is the result of this annual firing.

No one, of course, would dream of advocating that farmers on sour veld should cease burning at once over the whole of their farms. The process of reclamation, as one might call it, must be done gradually; from a small beginning, an increased area being left untouched

by fire each year. And at the same time, of course, the land must be well stocked.

That, then, seems to be the position, but we invite further correspondence on the subject, especially from readers in sour-veld areas. The whole question is an interesting one, and much good should come from open discussion.

**Veld-burning and Lamziekte**

It will have been noticed that our correspondent, Mr. J. J. Claase, is of the opinion that grass-burning has a distinct influence upon lamziekte. His theory is that the grass that springs up after a burning contains less phosphorus, to which deficiency in the veld he ascribes lamziekte. We do not propose to comment upon this, as it is a purely scientific question with which we are unable to deal at the present moment; but our object in referring to our correspondent's theory is to show, in the first place, how the various problems of the veld may often be found to be bound up in each other, and secondly, that free discussion is most useful and to be welcomed. In drawing attention to this matter, and in quoting below a letter which a Steynsburg farmer, Mr. J. H. Ferreira, has addressed to the Editor of the *Farmers' Weekly*, our object is to encourage a free discussion of veld-burning and such problems as, to the farmer, may seem to be connected with the evil. We know that the Director of Veterinary Research is pleased to learn farmers' experiences of lamziekte, and if this disease has, in the minds of any of our readers, any connection with the practice of veld-burning, they are invited to communicate their views.

Mr. Ferreira, in his letter above referred to, writes:—

> With reference to Mr. Stead's paper on lamziekte, I fully agree with him that the disease is not caused through what cattle eat, but through what they do not eat—a necessary substance that is required in the system to maintain the health and vigour of the animal. This substance is destroyed by the wanton destruction of the veld by fire, which I think is one of the worst customs and the greatest curse of this country—in so far that veld-burning will always impoverish the soil; it kills all the sweet and delicate plants to the root, and only the hardy and strong plants will shoot up again; every time fire has been over the veld it becomes so much harder and poorer for good feeding.
>
> About twenty years ago, when I was not much more than a lad, we also lived in a part where it was customary to burn veld, and there I became acquainted with gal-lamziekte, for we suffered heavy losess through the disease. There I came to the conclusion that it was caused through veld-burning, which is, as I have said, one of the worst customs of this country. It means that you can rear a nice crop of lambs on what is commonly known as a *brand*, while it is young, but on the other hand it means that you will lose one-third of your span of oxen, besides other stock, during the following season. Veld-burning does not do so much harm until the brand is about nine months old; that is, nine months after it has been burned, when it becomes very poisonous. Lamziekte will make its appearance, and continue for at least six months, or even longer, on this particular brand. There are times when burning will not do so much harm, that is, if veld is burned in the proper season. Vlei veld should be burned in June and July; high veld, I think, in January and February. Then it will not become so poisonous, yet it will always do harm.

Mr. Ferreira's views are, of course, simply the views of a single farmer, and, in publishing them, we do not identify ourselves with them. Our object, as we have said, is to encourage free discussion—for such discussion will probably be useful to the scientific investigators of the department who are studying lamziekte, as well as contribute to the study of the important question of veld-burning.

**Veld-burning and Erosion.**

Now, there is another question very closely connected with the matter of veld-burning which we have not yet discussed, but to which we referred in passing in our June notes. That is, the influence of firing upon veld erosion. It does not need much more than superficial observation to convince one that the question of erosion is a serious one, and that it is an evil that is growing instead of diminishing. It would be incorrect to lay the whole blame upon the practice of veld-firing, but without doubt it is responsible in no small degree. Every one knows how "Kaffir paths" upon hillsides tend to become sluits, and later dongas, yet at the same time the process of erosion of these paths is hastened by the burning off of the veld. As our correspondent, Mr. Prances, puts it:—

> The drift of dead grass, twigs, leaves, etc., even if it were of no value as humus, checks erosion in all directions, which is incredible till one takes careful note. Burning, of course, destroys this; deep grooves form between every tuft of grass, leaving them high enough to die of drought or to be kicked out by cattle, and the actual area of grazing is seriously reduced.

And, as our correspondents have pointed out, unburnt veld tends to become covered with a loose layer of soil, manure, dead grass, etc., which is, accordingly, absorbent, whereas the surface soil on annually burned veld is inclined to be hard, and, consequently, cannot absorb a heavy downpour of rain sufficiently rapidly to obviate a rush down the hillside.

One has only to observe the thick, muddy condition of some of our rivers after heavy rains to obtain an idea of what this process of erosion means. Those rivers hold some of our best soil in solution, soil that is carried off to the sea and lost to us for all time. And we have not only to consider the wearing down of our hillsides, there is also the formation of dongas to be borne in mind—a serious evil in this country. As we have said, grass-burning is not wholly to blame, but the cessation of the practice undoubtedly would materially assist in checking the evil of erosion generally.

It would be interesting and instructive to have the experience of farmers in connection with this matter, and anything that would tend to show the influence of grass-burning upon the evil would be especially welcome. We cannot spare space further to dwell upon the matter this month, and in the meantime we invite discussion.

**The Value of Milk Records.**

Dairying is making such rapid strides in South Africa that we think a few notes on the important subject of the keeping of records will be welcomed by those who have entered into the business with the firm intention of conducting their operations on modern lines. The day of indifferent cows, careless breeding, and bad methods of handling is passing, and the number of good dairy farmers is steadily increasing.

Dairy farming in modern times may be said to rest upon a twofold basis, namely, careful breeding and good business methods. The adoption of good business methods is not, of course, peculiar to dairying any more than it is peculiar to any other branch of farm practice. The farmer who sets out to make his proposition a success

must be a good business man. There is this difference, however, between the case of dairying and that of, for example, fruit culture or ostrich farming, namely, that the two pillars of the industry are essential to each other, according to modern standards of practice, and for this reason—that the term "business methods" in its application to modern dairying is a very comprehensive one. It does not simply include the recording of the financial affairs of the concern; it includes the keeping of records of the performances of the individuals of the herd. And with these records before him the dairy farmer has one of the prime essentials of progress.

The cow is man's milk-producing machine. Nature's work with the cow ended with the power she gave her of converting blood into milk as food for her young—and there man's work began. By careful breeding, in a relatively short time he has increased the cow's milk-secreting capacity far beyond the requirements of her young and has converted her into a veritable milk-producing machine. This process of rapid evolution, commenced along slow, painstaking lines—slow because memory and observation alone had to be relied upon as the basis of judgment—but it was hastened by the keeping of records—records of quantity of milk produced and (after the invention of the Babcock test) of the fat-content of milk and records of pedigree on the basis of milking qualities. The adoption and evolution of this business-like system placed the building up of a good dairy herd within the reach of every intelligent dairy farmer, indeed, it is difficult to exaggerate the advantages of the practice. For, disregarding the matter of conformity to type—a subject with which every progressive raiser of stock, whether of cattle or horses, sheep, or pigs must be conversant—it simply amounts to this, that, intelligently interpreted, these records point the way which the breeder must follow. Records of pedigree tell him which animals are most likely to produce useful additions to the herd—otherwise expressed they indicate the animals that are least likely to "throw back" to less desirable milking types. And, in the same way, like all records of pedigree they indicate the best stock for breeding in order to obtain animals that will approximate most closely to type. Again, milk and fat records show us which cows are producing the most and the best milk. The figures so obtained form a necessary adjunct to the pedigree records, whilst they also serve to indicate the individuals which should be excluded from breeding and which should be sold when they can be replaced by more profitable animals. We are able to see whether every cow is paying for her keep and yielding an adequate profit besides. In this connection many dairy farmers who have not yet started keeping records would probably be surprised to learn just what their various cows really are doing, and they would in many cases find it advisable to sell off some of their stock and replace them by more profitable animals. For, although the cow may be described as a milk-producing machine, the simile ends with the fact of milk production. Cows are animals with individualities. Every one knows the milk production of the cows in a herd varies, but few who have not kept records would realize the extent of this variation or what an apparently small difference amounts to in the course of a year. When the milk is not weighed it is a very easy matter to over-estimate the production of a cow. A cow may be giving from 12 to 15 quarts of milk in a day at a certain time, but this by no means goes to prove that the cow will give

5000 lb. in a year. The cow has to be fed and cared for during the entire twelve months, and the profit or loss depends upon what she will produce during the entire year.

**The Process of Milk Testing.**

It is a much simpler matter to keep records than is generally supposed. The process does not occupy much time and soon becomes part of the routine work of the farm. Daily records are, of course, the best, but there are other methods which can be recommended as satisfactory for all practical purposes. The Wisconsin Agricultural Experiment Station (U.S.A.), for instance, recommends weighing and sampling the milk one day each week during the year; the Illinois Experiment Station suggests weighing and sampling each cow's milk for fourteen consecutive milkings each seventh week.

The daily weighing of milk, which will form the record of quantity produced, should be done with a spring balance. A bucket should be kept entirely for the purpose of weighing, and, of course, the tare should be carefully ascertained and allowed for. For the purpose of testing the quality of the milk—in other words, its fat content—either the Babcock or the Gerber apparatus is used. The apparatus consists of a pipette for measuring the milk sample, an acid measure, graduated test bottles, and a centrifugal machine for whirling the bottles with their contents at a high speed. It is important at the outset to secure a fair sample of the milk to be tested. To do this it is first necessary to obtain a full milking of the cow from beginning to end. The importance of this is not sufficiently recognized, few farmers apparently being aware that the milk varies in quality as the operation of milking is proceeded with, the strippings being richest of all and often testing up to 8 per cent. of butter-fat. The milk must next be thoroughly mixed by repeatedly pouring it from one vessel to another—stirring alone is not sufficient. The milk is then in a condition to sample, but it must be sampled immediately and not allowed to stand, otherwise it will not be of even quality throughout, as, directly it is left standing, the richer portions of the milk tend to rise to the top. The pipette is filled, serving as a measure, and the milk is run out again into the test tube. It is then tested with acid (full directions accompany each set of apparatus). The action of the acid causes a rapid increase in temperature, at the same time dissolving all the non-fatty solids of the milk and making possible a rapid and complete separation of the fats. The test bottles and contents are then placed in the centrifugal machine and whirled at the required speed. The fats rise to the surface of the milk, and are measured on a graduated scale on the test tube. The result gives the percentage of butter-fat in the milk. The number of pounds of butter that a cow is producing may be determined by multiplying the pounds of milk produced by the percentage of butter-fat, and dividing the result by 85 (ordinary commercial butter having a percentage of approximately 85 of butter-fat).

This brief description will serve to give an idea of what the process of testing for butter-fat amounts to. The daily record of quantity will show how much milk each cow is producing, but farmers with fair-sized herds would do well to institute the fat test as well; as, with these two sets of data, the dairy farmer has a full record of

every cow in his herd, and he is thus able, as we have indicated, to improve his herd much more rapidly than he could ever hope to do with simply his unassisted observation to guide him.

We may fittingly conclude by quoting four useful rules which may be regarded as the fundamental steps to be taken in improving dairy herds:—

1. Take advantage of individuality. While the tendency of nearly all cows is to become average cows, a number fall below and a few reach a yield of 500 to 600 lb. of butter during their lactation period.

2. Those above the average should be carefully selected and bred with care and judgment.

3. While the test must be used to detect the individual merits of the cow from a buttermaking point of view and make selections, it is needed also to test the progeny, to determine whether the good qualities of the parent have been perpetuated, and to see if any improvement in the offspring has been made.

4. Feed, care, and management are of the highest importance. Having been carefully selected and stood the test, the cows must be well fed and cared for if their good qualities are to be retained and improved.

**Importance of Maize Testing.**

The majority of maize growers have now set aside their seed for the coming season, and for the benefit of those who have not yet shelled their seed ears the present time is opportune for a discussion of the important, yet unfortunately much neglected, matter of testing for germination. It is little less than remarkable that farmers should be willing to plant maize without first being reasonably certain that the seed which they are putting into the ground—and going to the expense and trouble of cultivating and manuring—is capable of producing good, healthy plants. Under ordinarily favourable conditions a stand of 80 to 85 per cent., or even less, is considered to be satisfactory; indeed, many would consider a stand of 95 per cent. or more impossible. Yet experiments have shown that, barring unfavourable weather at planting time, grubs, etc.—that is to say given favourable conditions—there is no reason why a stand of 95 per cent. should not be secured. Consider what this means.. Supposing a farmer to have ordinarily a crop of a thousand muids, and supposing he is able to increase that crop by 10 per cent., he will then have another hundred muids to his credit, which represents at least £50 clear profit, unless the simple operation necessary for this satisfactory result is to be accounted for, although it means no cash outlay. If each grower of maize would devote a little time in the spring to the testing of his seed the vitality of each individual ear intended for planting could be readily determined; the poor ears could be discarded, and the thousands of muids of seed maize which fail to grow each season could be profitably converted into pig products, or even sold as grain. This process may on the face of it seem to involve some little trouble; but it is worth the trouble, for it is now almost universally admitted that the testing of each ear separately is highly profitable. Experiments have shown that if a few kernels (preferably six) are taken from different parts of an ear of maize and all are found to

germinate well—that is to say produce good, healthy sprouts—practically all of the grains on that cob will likewise show strong vitality. On the other hand, if a part or all of the maize tested fails to germinate, or show only weak sprouts, the proportion will be the same for all the grains on such cobs. It is not sufficient to test a hundred or so grains from the entire lot of seed which has been shelled for planting, except possibly in a few special cases. The ears themselves should be taken for the purpose and selections of kernels made from them.

**How to Test**

After the ears have been carefully selected for seed they should be numbered (which is easily done by means of a label secured by a nail to the central pith portion of the cob at the butt end), and six kernels are then taken from different parts of each ear—each pair should be taken from opposite sides of the cob. The kernels from the different ears must be kept strictly separate, placing each lot in the square in the germinating box corresponding to the number of the ear from which they are taken.

There are various forms of germinating apparatus, but one of the simplest is a shallow wooden tray 1½ or 2 inches deep (inside measurement). The tray can be made of any convenient size—one 18½ inch by 12½ inch will suffice to test fifty-four ears at a time. The bottom of the tray should be covered with two or three thicknesses of heavy flannel, and a couple of thicknesses more should be provided for covering the seed. When new flannel is to be used it should first be thoroughly washed. The top layer of flannel on which the seed is to rest is now ruled off by means of a lead-pencil into squares measuring 2 inches each way and each square is numbered, and the apparatus is then ready for use. First of all the bottom pieces of flannel are thoroughly soaked in water and laid down, then comes the ruled piece (also soaked) on top. Now, the six grains that have been taken from each ear are placed in their proper squares—seeing that the numbers allotted to them correspond with the numbers of the ears from which they come—and when all the squares have been filled two more thicknesses of soaked flannel are laid carefully on top of the whole. The tray should now be covered with glass or oilcloth to check evaporation of the moisture in the flannel. Generally the first soaking given to the flannel is sufficient to germinate the maize grains, but should it be noticed at any time that the cloths are becoming dry a little water should be sprinkled on them to moisten them. To assist germination the tray should be placed in a warm room—in the kitchen, for example.

Germination should begin about the third or fourth day, but the counting should not be done until the sixth or seventh, or until most of the sprouts are from 1 to 1½ inches long. Six healthy sprouts in a square will indicate that the ear which they represent should be taken for seed. Should the six grains fail to germinate, or should they show weak sprouts, the ear which they represent should be discarded as unsuitable for seed; and this should also be done if two or three grains fail to sprout. There will be some cases where all six grains germinated but lack vigour. Such ears should be discarded if sufficient healthy ears are forthcoming, as they will only germinate given the most favourable conditions.

A table given in a bulletin published in 1906 by the United States Department of Agriculture demonstrates the importance of testing the vitality of maize intended for planting. The table gives the results of the germination tests of 3322 ears which had been saved for planting. Of the sixty-seven lots tested it is worthy of note that sixty lots showed an average germination of less than 95 per cent., forty-eight lots showed a germination of less than 90 per cent., and ten lots of less than 80 per cent. Of the 3322 ears tested 1416 germinated 100 per cent.—that is, every grain in the germinating box produced a good, healthy sprout. The average germination of the 1906 poor ears was only 77.7 per cent. The average germination of both the good and the poor ears, which would have been used for planting had not these tests been made, was 86.3 per cent., showing that 13.7 per cent. was gained by discarding cobs of low vitality.

**Ground-nuts and Maize.**

The Natal correspondent of the *Farmers' Weekly* writes:—

The Mayville Oil and Soap Works, near Durban, are offering to supply seed ground-nuts to farmers at 3½d. per lb, and undertake to buy the whole of their crop in the shell at 9s. 6d. per 83 lb., free on rail, Durban. This is a good offer, as ground-nuts on the market have averaged 9s. per 100 lb., and commission charged. The company have increased their plant and machinery greatly, and are well equipped for handling ground-nuts in large quantities.

We draw attention to this interesting paragraph as it bears particularly on certain comments which we had occasion to make last month on the question of green manuring. We are not going to recommend farmers to go in for ground-nuts wholesale—there is probably only a limited market for this crop—but what we would desire to call attention to is the profitable opportunity maize growers in particular (in areas where ground-nuts will do well) have of increasing the nitrogen supply of their fields at no expense—indeed, at a profit. Of course when it comes to green manuring pure and simple there is no question of selling the produce of the crop where, for instance, ground-nuts are grown, but the planting of this leguminous crop must necessarily leave a certain amount of nitrogen in the soil which will be beneficial to the maize crop following.

The point is that in districts where the crop will do well the earth-nut will prove a profitable rotation crop of which every maize grower would do well to take advantage. When, of course, the question of humus supply becomes a vital one, a leguminous crop should be ploughed in green, which means that there is no immediate return on the crop. Nevertheless, though the cash advantages are not immediately apparent, they become evident in course of time as succeeding maize crops are reaped.

**Keeping Farm Boys at Home.**

A most important trouble with which agricultural economists in many countries are now faced is the tendency of farm boys to gravitate towards the towns, where life outwardly presents greater attractions. This, in such a relatively new country as America, has become such an important question that it formed one of the matters which the recently appointed commission from America to Europe was appointed to inquire into. The interesting and instructive results of that commission's work we shall deal with in another issue, but in the meantime it will be instructive to glance at the efforts which the Ontario

Department of Agriculture, Canada, is making to check this evil. The matter has a certain amount of interest for us in South Africa, since we do not know when we may be faced by the same question in its gravest aspects, whilst there are already indications that the doubtful attractions of town life are proving a lure to the sons of even the most successful farmers.

The idea which the Ontario authorities have in view is to place in each county a man to examine and develop agriculture in all possible ways. Already thirty such men have been placed to date. These men, with their other duties, have taken up a certain line of rural school work hitherto overlooked. Every child is encouraged and assisted to grow better crops upon the home farm. To stimulate a lively interest in the work a school fair is held in a central school, and prizes are given for the best exhibits as in a regular agricultural show. The country is divided into districts, each containing eight or nine schools, and these are visited early in the spring and the work is explained thoroughly both to the pupils and to the teachers. In each school a committee of three is elected by the pupils to have general supervision of the work. The child receiving the highest number of votes is declared chairman. The eight pupils—the chairmen of each school—thus appointed constitute the show board, and elect from among themselves a president, vice-president, secretary, and treasurer. The others become directors. This procedure is followed partly to teach business organization to the children and partly to create a deep and personal interest in the work. Very many of the details of the management are left to their judgment, and they practically decide the classes upon which the prizes will be given. Each representative has practically a free hand in the work, and makes arrangements for those crops to be grown which are best adapted to his particular district.

From time to time type-written matter is sent to the teacher explaining in simple language a few of the elementary principles of plant and insect structure, methods of feeding and growth, conservation of soil moisture, feeding and rearing of chickens, the action of bacteria, etc. The teacher explains this to the children in an easy style.

When his other duties permit, the departmental representative visits the schools, gives little lessons in agriculture, and questions the children as to their progress. It is intended at a later date to lead up to a more comprehensive study and eventually to the high school short course.

Many other classes are made upon which prizes are given. The best collections of weeds, weed seeds, insects, and the work of insect and fungus diseases, secure prizes. These must all be named correctly by their common English names. Prizes are awarded upon the best collections of the finest varieties of apples. A large number of apples and weeds are also taken to the show, and those giving correct names of the largest number receive prizes. They are encouraged to find out all they can about each one, and prizes are given for the best compositions written about the work.

The girls compete in baking and sewing classes, and the boys in the construction of model poultry houses. To make the sense of competition throughout more keen a prize is given to the school making the best exhibit, composed of the individual exhibits of the

pupils. The prizes given are all in cash, and range from $1 (4s. 2d.) for a first to $.25 (1s. ½d.) for a fourth.

By these means it is hoped to make boys and girls take a greater interest in farm life, and so induce them to remain as part of the rural population instead of emigrating to the towns. The new movement in Ontario is considered to constitute the dawning of a new era in rural education, and a great deal is hoped from it.

**A Poultry Demonstration Train.**

Through the courtesy of the Commissioner of Customs we have received a copy of a report on the North Wales egg and poultry demonstration train (which toured from the 23rd April till the 6th May) by the director of the organization, Mr. Edward Brown. This train was run in view of the demand for an expedition similar to that in South Wales in April, 1910. This latter train was run at the expense of the Agricultural Organization Society and the National Poultry Organization Society, and the expedition was followed by remarkable and permanent results, educationally and otherwise. Existing societies have been led to take up the egg trade, and others have been successfully established. A great stimulus has been given to production, so much so that a railway official has stated that from one station where, up to the visit of the 1910 egg train, the maximum egg traffic was four or five cases per week, as many as a hundred such cases have since been dispatched within seven days. Nor has this been the only effect. There has resulted a considerable rise in values and prices, due to the adoption of better methods and to the finding of new outlets. A conservative estimate is that producers within the three counties visited three years ago are receiving from £25,000 to £30,000 per annum more for eggs and poultry than was the case at that time.

With such gratifying results as these in evidence, it was small wonder that a demand should have arisen for an expedition in North Wales. Offers of financial assistance were forthcoming, and accordingly the respective committees of the above-mentioned societies proceeded with the project.

**How the Train was Fitted.**

Two demonstration cars were provided by the London and North-Western Railway Company, in the form of a couple of their largest and finest corridor parcel vans, each 45 feet in length. In one of these, supplied with electric light, shelves were erected, and a partition with door specially fitted, in order to form a room for demonstrating the testing of eggs, the windows of which were darkened. This accommodated some thirty to thirty-five people at a time. A restaurant saloon was also provided, and a compartment therein was made into an office for the secretary, who dealt with the large amount of correspondence and reports incidental to the tour. The train was run as a special throughout.

The equipment of the vans was strictly practical, keeping in view the requirements of farmers and others. The exhibits included models of poultry houses, on a 3-inch to 1 foot scale; a trap nest, for the purpose of determining the individual productiveness of each hen,

with a view to the elimination of the bad layers; marking rings, for the purpose of distinguishing hens after passing through the trap nests; an incubator and four brooders; chick boxes, for the sale of day-old chicks; wire-netting; a newly invented bone crusher; apparatus in connection with the preparation of table poultry (cages in which the fowls undergoing the process of fattening are confined, shaping board by means of which the birds after killing and plucking are given the appearance required on the best markets, and a cramming machine for the forced feeding of chickens); an exhibit of dead fowls (birds of the quality required on and prepared for the best markets—these included Surrey fowls, spring chickens, trough-fed and crammed, and American chilled fowls; the methods of tying down and of packing were demonstrated); an exhibit of eggs (including English, Irish, Danish, French, Italian, and Russian produce, the idea being to show the competition which home producers have to meet); a series of egg barometers, consisting of six wire baskets of identical size holding exactly sixty eggs, weighing 18 lb. per 120. One of these contained eggs of that size, and the other five had respectively sixty 17 lb., 16 lb., 15 lb., 14 lb., and 13 lb. eggs, the gradations in total bulk being evident at a glance; and egg boxes of various makes.

A section of one van had been made to form a large testing room, wherein were lamps of various makes, some of which were operated with the electric light, by means of which the system was fully demonstrated. In this way new-laid eggs, as distinct from what are known as "spots," "rots," "cracks," broken yolks, developed germs, and "stales," can be discerned through the shells. Thus the quality and therefore the value are at once determined. A novelty was a testing table, which, if completed, would be circular. Perforated trays were fitted, below which were powerful electric lamps and reflector, so that the condition of the eggs could be immediately discerned. At one side was a testing compartment, which would be entirely closed in the complete apparatus, the operator in which, when he has finished each tray, turns the table, the eggs pass outside and are handled by others, another lot coming before him. This is a Dutch idea, the object of which is to facilitate and expedite the work of testing.

The vans were decorated by a very fine array of enlarged photographs, inclusive of a remarkable series (by Mr. C. Hearson), showing the development of the embryo, by drawings of breeds of fowls, and by tables indicative of possible developments in North Wales. Poultry leaflets in English and Welsh were distributed freely to visitors.

**Value of the Tour.**

The tour appears to have been an unqualified success. It was estimated that, during the twelve days, there would be about 12,000 visitors. Actually, however, there were 19,068 present at the demonstrations and 4870 at the meetings. During the time there were four really fine days and two half-days which could be so described. The remainder of the period was wet and cold, in some cases very bad indeed; and it speaks volumes for the interest awakened that on the two worst days the numbers of visitors recorded were 1655 and 1497 respectively.

The plan adopted was that as soon as the train reached the platform or siding the cars were thrown open to visitors. In these the

demonstrators were stationed, by whom the appliances and exhibits were explained. In this work several of the visitors rendered great service. At the time announced in the programme a meeting was held by the side of the train when the weather permitted, or in one of the railway buildings or sheds, or in public halls, the latter mainly at evening meetings. In all, during the tour, eighty-four addresses were delivered. A very important part of the work was interviews and discussions with visitors as to the adoption of co-operation, and also answers to questions. Special arrangements were made for elder elementary scholars to see the demonstrations, and of the number stated above about 3000 children are included.

In concluding his instructive report, Mr. Brown says: "The South Wales egg train in 1910 was an experiment which has fully justified the promoting societies by its results. That in North Wales has proved beyond doubt that the policy of organizing regularly similar expeditions in other parts of England and Wales is desirable to bring about increased production and improved quality of eggs and poultry. Schemes have already been drafted for other sections of the country. It is, however, a question of finance, and the time has come when an attempt should be made to secure from central and country funds adequate grants to enable two or three such trains to be organized each year, as educational missions of this character should not be dependent upon private generosity."

**Recent Work in Soil Sterilization.**

Various investigations have been made during past years into the question of soil sterilization by heat or antiseptics, and the effect of the process upon the bacterial flora of the soil, and, consequently, upon the productivity of the latter. Noteworthy among this research work are the investigations which have been conducted by Drs. Russel and Hutchinson, of the famous Rothamsted Experiment Station, in England; and these gentlemen have recently published a further paper giving the results of their latest work. In this paper, we learn from the *Journal* of the British Board of Agriculture, the authors consider that the conclusions reached previously have been confirmed and extended by the continuation of the work. Fresh evidence is adduced that bacteria are not the only inhabitants of the soil, but that another group of organisms occurs, detrimental to bacteria, multiplying more slowly under soil conditions, and possessing lower power of resistance to heat and antiseptics. In consequence of the presence of these detrimental organisms the number of bacteria present in the soil is not dependent merely on the temperature, moisture content, and other conditions of the soil. It may indeed show no connection with them; thus, rise of temperature may be accompanied by a rise in the number of bacteria, or a fall, or the number may be unaffected; increase in moisture content has also proved without action. The number of bacteria depends on the difference in activity of the bacteria and the detrimental organisms. When the soil has been partially sterilized, however, the detrimental organisms are killed and the bacteria alone are left. It is found that increase in temperature, up to a certain point, favours bacterial multiplication. The detrimental organisms are killed by any antiseptic vapour, or by heating the soil to from 55 to 60° C.; they suffer considerably when soil is maintained at even lower, but still higher than the normal, temperatures (e.g. 40° C. for a

sufficient length of time). Cooling to low temperatures also depresses them, although it fails to kill them. Once the detrimental organisms are killed, the only way of introducing them again is to add untreated soil.

The increase in the number of bacteria following partial sterilization by volatile antiseptics is accompanied by an increase in the rate of ammonia production until a certain amount of ammonia, or of ammonia and nitrate, has accumulated, when the rate falls. Thus two cases arise: (1) When only small amounts of ammonia and nitrate are present: here the increase in the number of bacteria following partial sterilization causes a corresponding increase in the amount of ammonia and nitrate; (2) when large amounts of ammonia, or of ammonia and nitrate, are present, the increased numbers of bacteria then causing no corresponding increase in the amounts of ammonia and nitrate. There is a fairly well-marked limit beyond which the accumulation of ammonia and nitrate will not go, although bacterial multiplication may still continue. The limit varies with the composition and condition of the soil.

**The Month and the Magazines.**

Discussing the question of the influence of potash on the elaboration and degradation of carbohydrates in the higher plants, the *International Sugar Journal* states that an investigation has shown that potash is indispensable for the elaboration of carbohydrates, for the process of physiological combustion, for the transition of substance in the chlorophyll-containing and chlorophyll-free cells. This fact is of particular interest in connection with the manuring of sugar-cane.

The *Live Stock Journal* reports that metropolitan abattoirs have been erected in Adelaide, South Australia, where the whole of the meat to be consumed locally is prepared under municipal supervision. At a cost of about £350,000 and on an area comprising nearly 500 acres, a vast array of appliances necessary to abattoirs has been fitted. All the latest hygienic and scientific improvements, laboratory, pathological, casualty, and dining rooms, and special apparatus for treating the by-products, have been installed. About 200 cattle and 3000 sheep are being killed and dressed each week, and a corps of specially designed motor wagons deliver the carcasses to the butchers.

The *Agricultural Gazette* (London) says that the four-year-old Aberdeen-Angus bull, Elmhore, bred by the late King Edward VII. and owned by Viscount Allendale, has been sold to a South American stock owner for £1000. Elmhore has proved not only a good sire and stock getter but also a great prize-winner, leading at the Highland as a yearling, as a two-year-old, when he was also champion and again as male champion. At the Royal show he was breed champion.

The *Agricultural News* (West Indies) calls attention to a new disease of horses, called Murrina, induced by a parasite identified as *Trypanosoma hippicum*, nov. sp. The disease first showed itself in the form of an epizootic amongst American mules and work horses in Panama. It resembled other trypanosomal diseases such as Nagana, Surrah, Mal de Caderas, and Senegambian horse disease; but it presented a group of symptoms and pathological features which made it likely that it was distinct from these. It is entirely a disease of mules and horses, for cattle are not susceptible. The disease is thought to be transmitted mechanically by flies through the broken skins of cuts and various wounds.

An account of the development of the United States Department of Agriculture during the last sixteen years is given in the report of the Secretary for Agriculture for 1912. As indicating the growth in cost of the department, staff, and publications, it is stated that the budget of the department in 1897-8 was £682,000; in 1905 it had increased to £1,481,000, and by 1907 it had risen to £2,725,000. Mainly as a result of additional duties in connection with food laws and the care of national forests, the budget had risen by 1912 to £4,352,000, and the expenditure sanctioned for 1913 is £5,155,000. The staff of the department has grown from 2444 persons in 1897 to 13,858 in 1912. The activity of the department is reflected in its publications, and some idea of the enormous growth in recent years may be gathered from the fact that in 1897 the different publications printed were 424, of which 6,541,210 copies were issued, while in 1912 the publications numbered 2110 and the copies issued 34,678,557.

Two years ago Mr. Henry Stone, a tenant farmer of Gloucestershire, emigrated with his family to Victoria, Australia, and purchased seventy acres of irrigated land from the Government. According to the *Melbourne Leader*, in his second year his net returns were larger than any of his thirty years as a farmer in England. His cows returned him £273 and his pigs and calves £60, in addition to which he had forty-one acres sown under lucerne. One point made by Mr. Stone is that cows in Victoria cost only about half as much as they do in Gloucestershire, while they are equally profitable.

In the *Journal* of the British Board of Agriculture, Mr. John J. Dunne gives some interesting particulars of the tuberculin societies which have been formed in various parts of Denmark. The Tuberculin Union of Remkold is taken as an illustration. It was founded by Mr. N. O. Nielsen, veterinary surgeon, in 1905; and its rules provide that, to become eligible for membership, the farmer must have had his cattle inoculated with tuberculin. He must divide his stock into two herds: one reacting and the other non-reacting. He must keep the herds in distinct cow-sheds and provide them with separate pasturage and attendants; if possible, they should be isolated on different farms. He must thoroughly disinfect the cow-sheds, troughs, and all utensils used by the non-reacting herd. He must have his healthy herd inoculated with tuberculin every six months. He must remove the calves of the reacting herd and feed them either on milk from the non-reacting herd or on pasteurized milk. He must not add any calves to the healthy herd except those which have given non-reacting symptoms to the tuberculin test made when the calves are some days old. He must not add any cattle bought at a market to the healthy herd without previously submitting them to the tuberculin test. He must sterilize the milk of the tuberculous cows before using it as food, either for man or beast. He must immediately get rid of the reacting animals that show clinical symptoms of the malady. Those, briefly, are the rules to which each member must subscribe. The union started with twenty-nine members and has now one hundred and fifty-five. Of the one hundred and fifty-five herds of cattle ninety-one were healthy when their owners joined the union, while the remaining sixty-four were reacting. At present one hundred and thirty-five of the herds are non-reacting and only twenty reacting.

# Root-knot, Gallworms, and Eelworms.

A short account arranged by CLAUDE FULLER, Division of Entomology.

SOME of the sicknesses of many plants, more particularly those of the vegetable garden, are directly due to the activity of certain microscopic creatures popularly called gallworms and eelworms. Nor do field crops escape, and in South Africa at least two serious troubles, one of the potato and the other of lucerne, are to be laid to their account.

The mischievous forms to be met with at present are introductions from abroad in the first place and not native species. Some of them have a very firm foothold already, and their extirpation is quite out of the question; at the same time by reasonable precautions their introduction into new lands can frequently be guarded against when one is acquainted with their nature, habits, and the more general means by which lands become contaminated. Properly speaking, these pests are true worms of the group called nematodes, one that includes many families, the members of which are not plant-inhabiting but live a parasitic life in the organs and tissues of animals. Conspicuous among these are the threadworms and wireworms (which inhabit the gut, lung, and stomach of farm stock), the whipworms (such as that which causes trichinosis in swine), and the pinworms (familiar parasites of children and animals).

It must not be supposed that they are insects. Only popular usage has sanctioned such terms as "silkworm," "army-worm," "cutworm," and "wireworm" for the caterpillar or grub stage of various moths, butterflies, and beetles. These are certainly vermiform in appearance, but as insects differ essentially from true worms which, apart from the forms above mentioned, have other familiar representatives in the beneficial earthworm, the insidious tapeworms, and the flukeworms.

None of the plant-inhabiting forms are parasitic upon animals, and so must not be confused with such that are.

The primary introduction of such pests into South Africa has been by means of rooted plants, bulbs, tubers, and seed. To-day they are first introduced into fields by exactly the same agencies, but their local spread is due to a variety of causes.

First we may consider their spread from a given centre by their own activity, and this experience and study shows to be very restricted. They are not able to migrate far afield by their own endeavour despite the fact that they have a well-developed habit of seeking fresh food supplies in the soil. Their spread about a garden or a farm is largely due to their carriage by irrigation and flood waters. Indeed, they may be washed far afield in the silt carried off the surface by a heavy fall of rain. Potent factors in their spread from part to part and field to field are men's boots, the hoofs of animals, the wheels of vehicles, and farm implements—all movables, in short, to which damp soil naturally clings.

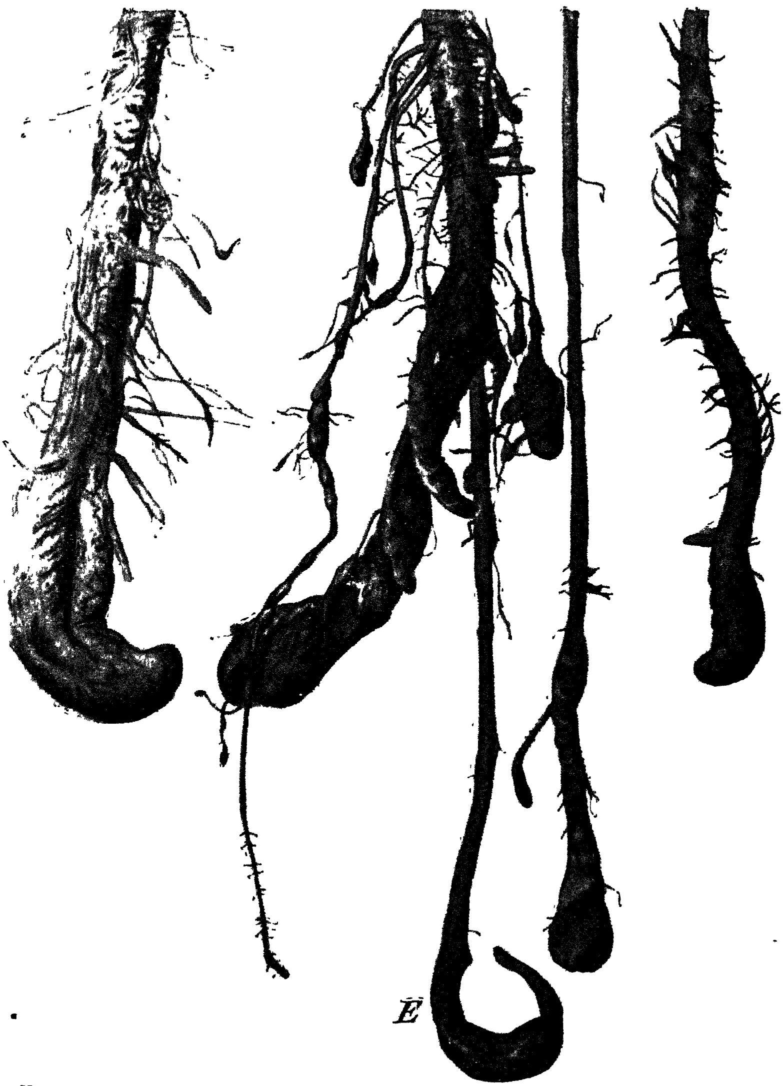


*Plate No. XXXIII.*

ROOT-KNOT OF LADY-FINGER BANANA, CAUSED BY GALLWORMS.

## EAR-COCKLE OF WHEAT.*

Whether this disease actually exists within the Union the writer cannot say of his own experience, but it would be indeed remarkable if somewhere or another it did not occur in our broad acres. Be that as it may, it is too interesting and instructive a form of eelworm attack to pass unnoticed.

Ear-cockles, also known as "pepper-corns" and "purples," are short, thick, dark-brown galls resembling seeds of corn-cockle† which are found in several parts of the wheat ear, taking the place of wheat grains. These galls when opened are found to contain a yellowish white mass composed of hundreds or even thousands of young eelworms, and the question which arises is: "How came they there?" They are quite dried up and apparently dead. Are they dead? If not, what is their future?

They are not dead. They are simply preserved, and, when moistened, revive and become active. They illustrate most vividly one of nature's grand provisions against the extinction of her species,

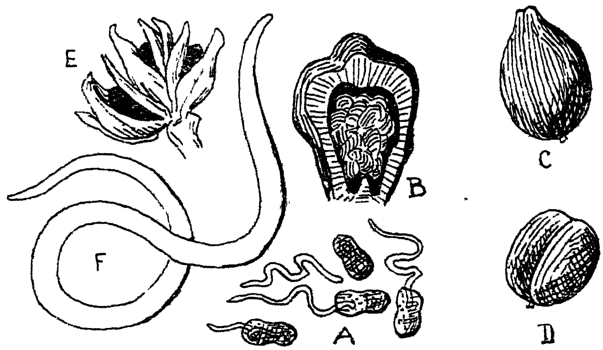


Fig. 1.—Illustrating various phases of Ear-cockle of Wheat.

A. Eggs and young worms escaping from them. B. An ear-cockle as seen in section, with wormlets within. C. and D. Ear-cockles. E. Spikelet of wheat containing ear-cockles. F. Wormlet. (All more or less greatly enlarged.)

however humble. It has been found that even after the galls have been kept dry for a period of twenty-seven years the worms will become active on moistening.

In the ordinary course of affairs when the wheat crop is harvested so are the cockles, and, when the wheat is sown, into the lands with the wheat grains go the cockles. The very moisture which germinates the wheat and makes the wheat plant grow awakens to life and activity the mummified worms. The walls of the gall decay and the worms travel to the wheat seedling and take up their abode within its tissues. When the ears form the eelworms travel quickly from all parts of the plant into them and take up a position in the rudiments of the flowers. The irritation set up by their presence causes these immature parts to swell up like bladders and form the protecting cockles wherein the worms complete their development and produce their numerous progeny.

* In this and the following accounts the authorities are often quoted from *in extenso*.—C. F.
† Corn-cockle: a weed of the wheat field.

This wheat eelworm therefore not only depreciates the yield of grain, but during its sojourn in the tissues seriously handicaps the growth of the plant. Badly infested wheat plants have relatively short haulms and the leaves are often sharply bent and have wavy margins.

*Remedies.*—Plant only seed wheat which has been carefully screened so that no ear-cockles are present.

### THE NOTORIOUS STEM EELWORM.

This pest lives and reproduces in a wide variety of cultivated plants, but with this peculiarity, that those worms of which the progenitors have developed for a considerable number of generations in the same kind of plant do not easily infest another kind of plant, or, at any rate, do not multiply vigorously therein.

For example, those of which the ancestors have lived for many generations exclusively in rye, or alternately in rye and buckwheat, do not readily pass over to seedling onions, etc., and, when they do, at first only reproduce in them to a small extent. Despite the wide range of plants which suffer seriously from it, trouble has seemingly only arisen in South Africa in the cases of lucerne and carnations. This pest inhabits only the stems, leaves, and branches, and is never found in the roots. As in the case of the ear-cockle of wheat, stem eelworms pass from old infested plants into the soil and from the soil to young seedlings. This species differs from the former, however, insomuch that during the summer there are several generations, whilst the wheat eelworm does not reproduce until it forms the cockle, and consequently there is only one generation. When the worms have penetrated the plant tissues the parts involved become considerably thickened, whilst the growth in length is either much diminished or even entirely stopped. Other symptoms also intervene, and the damage grows worse and worse as the eelworms increase and multiply, so that the death of the whole or a part may ultimately follow. Here it is to be noted that the kind and constitution of the infested plants have an important influence upon the progress of the disease, some plants suffering more and succumbing more readily than others.

### EELWORM DISEASE OF RYE.

This European trouble is due to the stem eelworm under discussion.

The disease principally appears in regions where the culture of rye is carried on to excess. Germination of the seed-corn goes on quite normally in the infected fields, and it is only exceptionally that anything particular is noticed in the young plants of winter rye during autumn and winter. The disease appears at the beginning of spring. Some plants soon become yellow and die; others appear to grow very luxuriantly; they possess a beautiful bluish-green colour and seem very healthy; later on they develop enormously in breadth, and each separate plant covers a relatively large area. The base of the stem swells abnormally, so that the plant looks as if it bore below an onion projecting above the ground. This is caused by the lower joints of the haulm remaining very short and thickening considerably, causing the leaf-sheaths which surround the base of the stem to become thicker and broader than usual. The feeble development of roots is also characteristic. The leaves generally remain short, but get very thick; they often become wavy, and may even appear frilled. All the leaves,

however, are not crumpled in this way; a few remain quite normal, while others are small and grass-like, but thick. Later on the tip of the haulms and the ear often do not come out of the leaf-sheaths; in

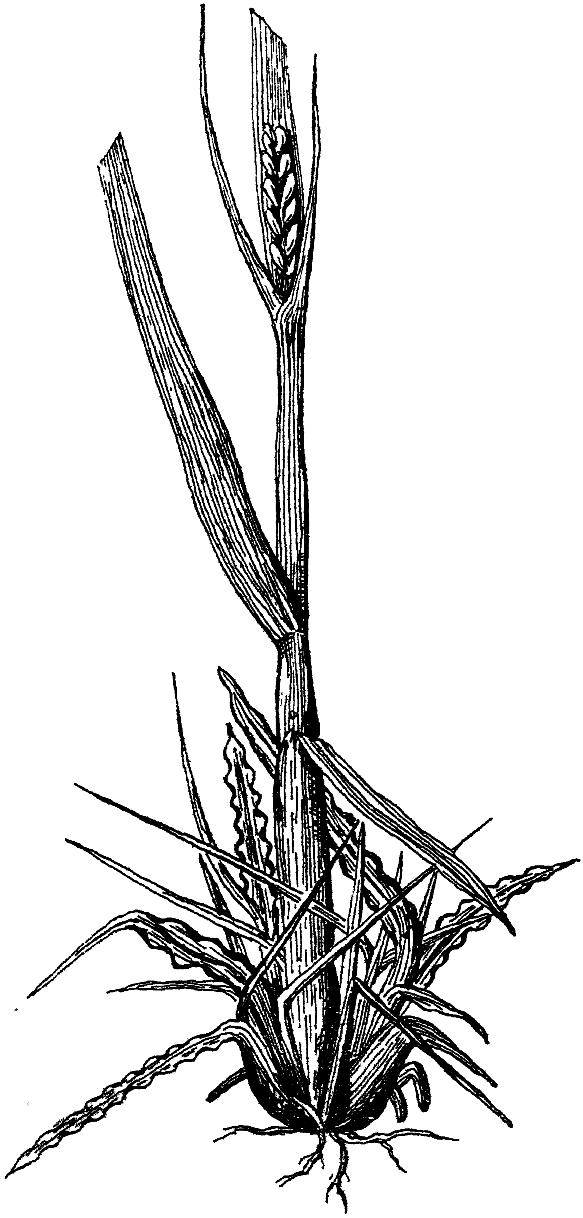

Fig 2.—Rye-plant in the later stage of Eelworm disease.

other plants the ear may appear, but remains small and deformed as well as the rest of the haulm, while the grains which develop are small. A number of shoots, however, may develop normally and bear

fruit. Badly infested plants quickly die, some at the very beginning of spring, others later.

When the disease is very bad it may easily be recognized by its characteristic distribution. A number of bare places are noticed in spring on the infected fields; round about these places still living but badly diseased plants may be seen, and the symptoms of attack are less obvious the further one goes from the bald spots.

On the death of the rye plants the eelworms mostly travel back to the soil, but sundry eggs and larvae stop in the dried-up remains. Rye straw may further infect a diseased field by getting into farmyard manure and being brought back again with it, for the eelworms (at any rate as eggs and larvae) are killed neither by drying nor by the action of dung and other decaying substances. Strongly infected spots (bare patches) on an infested field are usually the places where dung containing diseased rye straw has lain for some time. From such centres

FIG. 3.—Oat-plant, showing Tulip-root or "Segging," and a group of Eelworms greatly magnified.

the spreading of the eelworms takes place: (1) Actively by the migration of the worms; (2) passively by rain, the feet of labourers, the hoofs of horses, field implements, etc.; also (on loose soils) by the wind, which not only blows about particles of earth, but also the dried-up larvae which are always found on the surface of the ground. As the eelworms multiply very rapidly whenever they are in the plants, and as the means of distribution are very numerous, the disease spreads with great rapidity.

*Remedies.*—Proper rotation; limitation of the culture of rye, growing in place of it carrots, turnips, or lupines. Now and then (but not too frequently) potatoes, buckwheat, clover, and oats may be cultivated in the fields affected, at any rate before sowing rye again. Abundant manuring, especially with sulphates of potash, ammonia, and iron. Deep cultivation of the soil, since the eelworms find no food in the deeper, damper layers of the soil, nor can they pass into the dried condition, and so must die.

Oats suffer from stem eelworms just in the same way as rye. The disease is popularly known as "tulip root" and "segging" in England, and takes its name from the swollen appearance of the base of the stem. This swollen basal part is surrounded in most cases with

contorted shoots of pale unhealthy hue. The minute eelworms are found in abundance amongst the deformed shoots and in the stem at its base. In England it is known to attack oats, rye, clover, onions, and turnips chiefly. It also occurs in wheat, buckwheat, and various wild grasses, and in daisies, buttercups, and plantains. Barley and carrots, it appears, are free from its attack.

Clover sickness is marked by short stunted shoots and whitish rounded buds, often remaining closed; also by the whitish colour and abnormal thickening of the shoots and buds.

### STEM EELWORM DISEASE OF POTATOES.

Crumpling and small growth of the parts above ground. In many cases there may even be no potatoes at all, or only small ones, poor in starch, though sometimes they may be tolerably large. On the surface of the tubers there are discoloured rotten spots, not penetrating deeply, and usually, but not always, at the attacked end. These dark patches contain the eelworms.

### STEM EELWORM DISEASE OF BUCKWHEAT.

Joints of the stem for the most part much thickened, but abnormally short. In many cases a large amount of branching in the lower part of the stem, usually at a place where it bears a nodular swelling. Branches generally short. There may be twists and bends in the stem and branches. Often, but not always, the formation of flowers and fruit is stopped. The thickened parts of the stem are brittle; they contain the eelworms in their interior.

### LUCERNE TYLENCHUS.

As has been already indicated, this nematode disease is but another illustration, and our most striking local one, of the evil propensities of the stem eelworm.

It is known to occur in all four Provinces of the Union, and it is unlikely, despite the comparatively short time that the trouble has been recognized, that a single district in which lucerne is largely cultivated has altogether escaped infection.

Naturally the disease has much of the character of that of rye, and is spread in the same way and by the same factors. South African experience clearly shows, however, that the pest is chiefly spread with lucerne seed. So far as has yet been determined, it is also impracticable to distinguish infected seed from non-infected seed, and impossible to destroy or remove the infection without killing the seed. It is known that the pest enters onion seed in Europe, and the highest authority on the subject, after close study, announced that he could not tell an infected seed from a normal one. Seed from badly infested plants, however, produced some infested seedling plants. Onion seed can be disinfected, it is said, by soaking it in dilute sulphuric acid. Lucerne seed, unfortunately, itself succumbs if subjected to the treatment.

In general, high-class imported seed is, doubtless, safer to sow, as regards tylenchus, than unselected South African grown seed. But the best and safest seed for the South African grower to use, when he can make sure of getting it, is seed grown in this country in fields which are free of tylenchus and other communicable troubles. Many

farmers can supply their needs from their own farms, and others can purchase from farms which by inquiry or personal inspection they find to be above suspicion.

The nematodes exist in large numbers in the above-ground parts of the infested plants, and cause characteristic distortions and discolorations which serve to indicate the presence of the trouble. Infested shoots may fail to grow out more than a few inches, and the whole plant languishes, so that in the course of a few months or perhaps a year or more it succumbs entirely. Failures due to it have been attributed to many general causes for decline, such as drought, over-irrigation, unsuitableness of soil, over-stocking, age, lack of cultivation, and unfavourable treatment in other respects, and very few farmers of the many whose lands have been ravaged have supposed that anything out of the ordinary was the matter. Consequently little has been said of any trouble, the disease long escaped recognition, and it is now difficult to determine its real importance.

The effect on the growth of the plant is such that the trouble may be fairly easily detected where much of it is present, after the observer once learns to distinguish it. There is almost invariably a pronounced swelling of the stems. The swellings may involve the whole of a new shoot, or may be confined to the base or to any other part of the stem or to the buds. A single one or more of the shoots may be affected, and a plant which has many affected has a peculiarly stunted, unhealthy appearance. A shoot which may be only a twelfth of an inch in diameter where it joins the crown may suddenly enlarge to nearly a quarter of an inch. Whilst broadened, the shoots are shortened, and the bases of the leaves are densely crowded along the thickened part. Then the sheath-like bases of the leaf stalks, which should be whitish, are generally tinged with brown, and more or less of the surface of the thickened parts is likewise discoloured. Shoots which have been long affected may have brownish stems, quite as if they were stained with tobacco juice. The pith of diseased shoots is generally brownish for part of its length, and often is ragged and very much discoloured throughout. Within the discoloured pith and under the discoloured epidermis, and at the base of the discoloured leaf-sheaths, the worms are to be found. Superficially they somewhat resemble the fine whitish hairs which clothe the plant, but the fact that they squirm slightly enables one to distinguish them with a pocket magnifying glass. As a rule they are most numerous where the discoloration is greatest, and often they are so numerous in the pith as to appear to the unaided eye like a tangle of white thread. Sometimes the diseased shoots grow up and then betray the trouble by a partial blanching of the terminal growth, and often diseased buds are also abnormally pale.

Careful studies made in Europe have demonstrated that at certain stages of its life the worm is able to come to rest, and then to retain its vitality unimpaired for a long period without food or moisture. This may happen in the surface soil or in the dried remains of plants. It is because of this remarkable characteristic that the pest is most to be feared. Infected stems which are made into hay may establish infection at a distance, and infected soil may be carried by water or on the feet of animals and on wheels, and may even be blown by the winds into near-by fields, and, worst of all, dormant infection may accompany seed. The present distribution of the trouble, however, suggests that years may elapse before it spreads even across a road

or a water furrow; and hence, by the exercise of suitable precautions, there is hope that the farmer can greatly retard the progress of the pest through his lands.

The trouble has been known in Europe for nearly a century, and perhaps longer, and the worm itself became known to science over fifty years ago. It was discussed as a lucerne pest as far back as 1881, at which time the strain found in lucerne was thought to be a species distinct from that previously described.

As far as has been learned it is not a pest of much importance in European lucerne fields, but this may be merely because various other troubles have led to a practice of growing lucerne chiefly as a rotation crop, and not as a permanent one. The leading measure for the control of such a pest as this one is crop rotation, and the alternation of maize or some other crop or crops with lucerne seems to promise most as a remedy. The intervening crops adopted should in time become those which experience demonstrates to be immune, or practically immune, from attack in order that the pest may be starved. If started with clean seed on cleaned land, lucerne may be found to last as long in a rotation as it is ordinarily profitable without renewal when stock is run on it, say six to eight years. As a substitute for rotation, successive waterings, coupled with almost continual close browsing by ostriches for a few months, seems worth a trial. The watering might result in bringing to life and forcing into the plants most of the worms that would otherwise lie at rest in the soil, and the close feeding down of the lucerne without giving any worms a chance to mature might result in most of them being devoured and thus destroyed.

Oudtshoorn farmers are inclined to make light of the tylenchus. They can afford to, because their district has already become widely infested, and because under their conditions of farming lucerne with ostriches the pest does not seem to work as great havoc as it has shown itself capable of doing under the conditions prevalent in some other districts. It will be many years, perhaps, before it is clear how serious a pest the tylenchus is, and meanwhile farmers will do wisely to avoid unnecessary risks of introducing it with seed, and also with manure, and those that have it in some fields but not others should, as far as possible, avoid acts which might carry infection into the clean ones.

Infested lands should be used for some other crop for a few seasons. Trouble should be taken to extirpate any lucerne that survives the ploughing, for odd stools that are left are likely to establish bad centres of infestation very quickly after the land is planted again to lucerne.

(*To be continued.*)

# Plant Diseases in South Africa.

By I. B. Pole Evans, M.A., B.Sc., F.L.S. (Chief, Division of Plant Pathology and Mycology).

Plants, like animals, are subject to a variety of diseases. Rust in wheat, witch-weed or "rooi-bloem" in mealies, white rust or mildew in tobacco, bitter-pit in apples, black-spot in peaches, scab in potatoes, mildew in grapes, smut in wheat, barley, oats, and mealies, collar rot in orange trees, are troubles familiar to most farmers and fruit-growers throughout South Africa.

These and all other plant diseases may be assigned to one of two main causes. They may be due to the action of the non-living environment, such as temperature, light, atmosphere, soil, wind, water, etc., or they may be induced by the action of living organisms such as animals and plants.

Examples of the action of the non-living environment are to be seen in the injuries resulting from drought, sunscorch, hail, frost, unsuitable water supply, and unfavourable soil conditions.

The gumming of wattles and fruit trees, bitter-pit and water-core in apples, the yellowing or chlorosis of citrus and other trees, the variegation or chlorosis of the mealie, and the frenching or mosaic disease of tobacco. are typical instances of disease produced by the action of the non-living environment.

Living organisms which induce disease in plants may conveniently be grouped into two classes—those due to animals and those caused by plants.

Familiar examples of animal injury are to be seen in the case of locusts, caterpillars, aphides, scale-insects, eelworms, bagworms, and phylloxera.

The combating and control of pests of this kind fall within a special province of their own, and are dealt with by the entomologist.

Plants as agents of disease may be divided into two main groups: those which are clearly visible to the naked eye and are flowering plants such as the "rooi-bloem" or witch-weed of the mealie, dodder on lucerne, mistletoe and *Loranthus* on citrus trees; and these which more often than not are overlooked by the casual observer and require the aid of some high magnifying power for their detection and determination. This latter group of plants is composed chiefly of the fungi, which are responsible for the majority of plant diseases. In addition to the fungi certain extremely microscopic organisms known as bacteria also play a very important part in the domain of plant pathology.

It is chiefly with those diseases in plants caused by the non-living environment and also by fungi and bacteria that this article is concerned. In fact, it is not so much the diseases themselves that will be dealt with, but rather the equipment provided by the Union Government for their investigation.

The scientific study of plant diseases is of comparatively modern date. It is known as phytopathology. An institution or building specially equipped for the investigation of plant diseases is termed a phytopathological laboratory.

Disease, whether it be in plants or animals, is nothing more than abnormal physiology, whatever may be the causes that bring it about. A phytopathological laboratory must therefore be a place where the pathological processes in plants, both normal and abnormal, can be studied in detail, and where, too. the factors or organisms responsible for disease can be subjected to careful experiment and reproduced at will.

The object of the present article is to bring to the notice of farmers, fruit growers, and all those interested in the agricultural welfare of the country the phytopathological laboratory recently established for the Union, and to which matters relating to plant diseases may be referred.

*Plate No. XXXIV.*
PHYTOPATHOLOGICAL LABORATORY, DEPARTMENT OF AGRICULTURE, PRETORIA.

The laboratory is located in Pretoria. It is situated on the quartzite and shales of the south-western slope of Meintjes Kop, in close proximity to the Union Buildings, being just a little below them to the west. The laboratory is contained in a building which was not especially constructed for the purpose, but which was formerly used as a dwelling-house, known to the older residents of Pretoria as "Vrede." It stands at an elevation of 4400 feet above sea-level. The building is one story high and faces due south.

The laboratory and grounds occupy the space enclosed within the first bend made by the main road from the corner of Vermeulen and Nel Streets in its steep and tortuous approach to the Union Buildings. The ground is nearly nine acres in extent. Beyond a number of grasses, very little of the original native flora remains on the premises, but its place is taken by an assortment of introduced trees and shrubs,

Chief among these may be mentioned an avenue of 100 tall gum trees which line the main roadway to the building. An avenue of some thirty tall and slender cypress trees (*Cupressus sempervirens*), which shelters below an exceptionally well-grown hedge of Jerusalem thorn (*Euphorbia splendens*), is also a conspicuous feature of the grounds. The footpath leading up to the laboratory from the entrance in Nel Street runs up between the cypresses. Some plants of Bouganvillea have climbed up to the top of the tall cypresses and have added colour to the sombre green.

Well-grown trees of *Grevillea robusta*, *Pinus halepensis* and *P. canariensis*, *Ligustrum sinensis*, *Cupressus lusitanica*, *Callitris cupressiformis*, *Juniperus bermudiana*, *Cinnamonium camphora*, *Casuarina*, *Araucaria excelsa* and *A. bidwellii*, *Camellia*, *Jacoranda*, and *Rosa* are the chief ornamental trees and shrubs present.

The fruit trees on the premises include loquats, quince, grape vines, pear, peach, apricot, and several varieties of citrus. (Fig. 5.)

Among the endemic trees and shrubs may be noted the "Kaffir Boom" (*Erythrina caffra*), the "Pride of de Kaap" (*Bauhinia Galpini*), "Mispel" (*Vangueria infausta*), "Wacht-'n-beetje" (*Zizyphus mucronata*), *Royena pallens*, *Acacia caffra*, *Acacia robusta*, *Gymnosporia*, and several species of *Asparagus* and *Clematis*.

The laboratory itself consists of a well-built brick building, and is provided with a broad stoep on the east, south, and west sides. It consists in all of thirteen rooms. (See ground plan.) The main entrances are from the south and north.

The front of the building is occupied by the chief's private laboratory (fig. 1) and the herbarium.

The herbarium—a beautifully oblong room on the west side, measuring 37 feet 4 inches by 18 feet 4 inches—is well lighted on two sides. Attached to it is a small workroom for the herbarium assistant, measuring 14 feet 6 inches by 6 feet 9 inches.

It will be well perhaps to explain here what a herbarium is. A herbarium is a room specially set apart for the systematic arrangement of collections of dried plants, all carefully numbered, named, and labelled.

The object of course in storing away all these plants is for purposes of comparison and that they may serve as historical records, in that they can be taken out and deductions drawn from them later on.

The herbarium naturally contains a large and representative collection of South African fungi, special attention being devoted to those of economic importance.

The chief's private laboratory, which measures 18 feet 4 inches by 16 feet 1 inch, is lighted on two sides from the east and south. A view of the fittings at the south-west corner is shown in figure 1. Adjoining and leading into it is a small library 18 feet 4 inches by 7 feet 9 inches, which contains many of the standard works on botanical research, and where a large number of current periodicals dealing with phytopathology may be consulted by members of the staff.

Next to the library, and situated in the coolest place in the laboratory, is the incubator-room, measuring 18 feet 4 inches by 11 feet 8 inches, and containing eleven incubators, all of which—except the ice incubators—are heated by electricity.

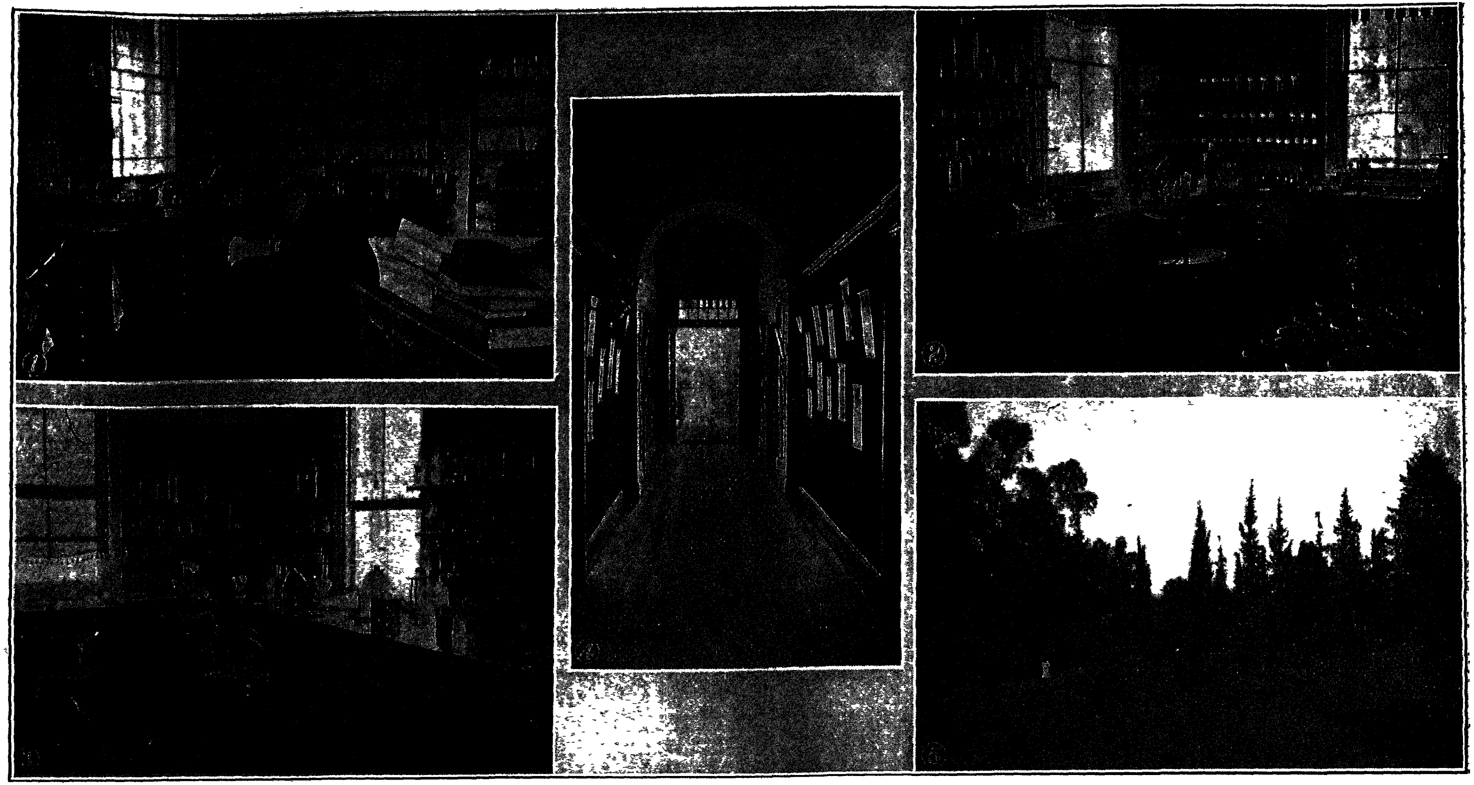

*Plate No. XXXV.* PHYTOPATHOLOGICAL LABORATORY, DEPARTMENT OF AGRICULTURE, PRETORIA.

1. Chief's Private Laboratory. 2 and 3. Assistant's Laboratory. 4. Main Hallway. 5. Corner of Laboratory Grounds; loquats and citrus trees in foreground.

These incubators are each regulated at various temperatures, and are employed for observing the growth of parasitic fungi and bacteria under artificial conditions.

The assistant's laboratory is situated at the extremity of the east wing, and is well lighted on three sides. A blackened wooden laboratory bench runs round on the sides opposite the windows (figs. 2 and 3). The room measures 23 feet 11 inches by 13 feet. Adjoining it is a small room facing south, measuring 12 feet 3 inches by 6 feet 5 inches, which is heated by electricity and is used as an incubator in the cultivation of organisms on a large scale.

Facing north are two rooms 18 feet 1 inch by 13 feet 6 inches and 13 feet by 12 feet 3 inches respectively. These are fitted up as research rooms, the smaller room of which can also be used as a dark-room for photographic purposes. Also facing north is the general office for the clerical staff, measuring 18 feet 1 inch by 13 feet 6 inches.

The sterilizing-room and general laboratory is situated in the north-west corner, and measures 18 feet 1 inch by 11 feet 4 inches. To it a small washing-up room 8 feet 4 inches by 7 feet 7 inches is attached.

Next to the sterilizing-room, also facing north, is a room 18 feet 1 inch by 7 feet which is provided with a cellar. This is used for the storage of culture media, etc.

The main entrance opens into a large central hallway, on the walls of which are hung photographs and illustrations of various plant diseases and of edible and poisonous fungi. (Fig. 4.)

All the incubators, sterilizers, autoclaves, paraffin baths, and other necessary appliances are heated by electricity. The only naked flames used in the laboratory are spirit lamps for the purpose of sterilizing platinum needles, etc.

Having now described the phytopathological laboratory of the Union, it will be well perhaps to say a few words regarding the nature of the work that is being conducted there.

The laboratory has been established for the purpose of giving farmers and fruit growers, and those interested in any way in the agricultural industry of the country, information regarding diseases in plants and insects caused by fungi and bacteria, information regarding edible and poisonous fungi, and information with respect to remedial measures against parasitic and non-parasitic diseases of plants, including the action and use of fungicides. Any one desirous of information on these points should always, if possible, forward specimens for examination, and state as fully as they can in the case of diseased plants their own observations as regards the general appearance and effect of the disease, the percentage of the crop affected, and any further information that is deemed of interest.

In forwarding diseased plants for examination the material should always be well wrapped up in plenty of dry newspaper and dispatched so that it will arrive at the laboratory in as fresh a condition as possible. It frequently happens that specimens are either sent loose in a large cardboard box or wrapped up in a damp cloth. In the first case the specimens usually dry up too quickly, and in the second case they often become far too mouldy before they reach their destination. Specimens for examination should be addressed to "The Chief, Division of Plant Pathology and Mycology, P.O. Box 1294, Pretoria," and marked "Diseased plants for examination."

Farmers and planters who contemplate planting out crops of any kind on a large scale are also advised to consult the Division before doing so as to the dangers of infection from the various fungus pests and bacterial diseases that are likely to be encountered. For it has happened more than once during the past few years that considerable sums of money have been thrown away in attempting to raise crops under conditions which the Division at the outset would have predicted to have been mere folly.

It is also most important to remember that in dealing with plant diseases prompt action is very necessary, and that it is only by an intelligent appreciation of the causes of the disease that the trouble can be remedied or mitigated. It is no use waiting until the crop

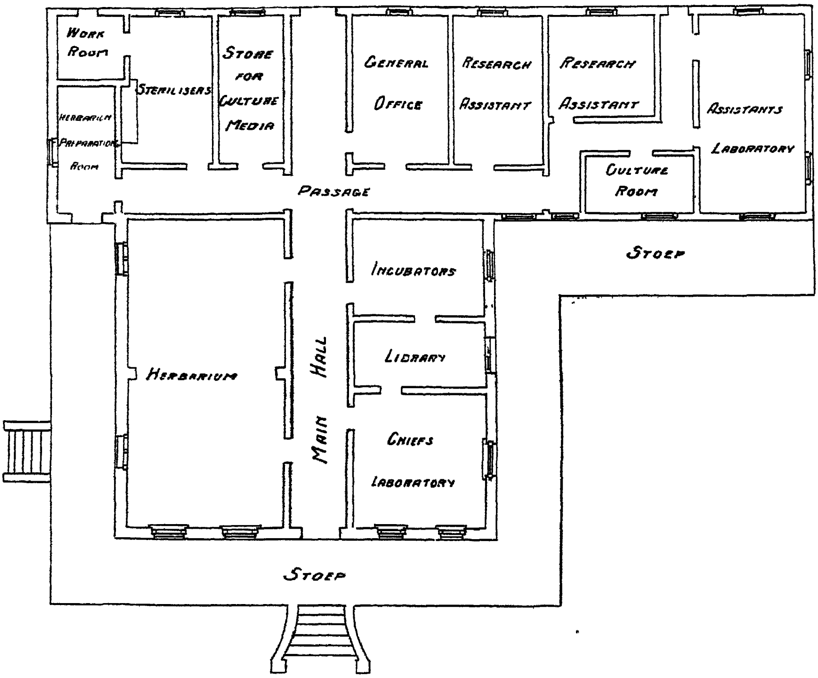


*Plate No. XXXVI.*

GROUND PLAN OF PHYTOPATHOLOGICAL LABORATORY, DEPARTMENT OF AGRICULTURE, PRETORIA.

has been partially or completely destroyed before any steps are taken to cope with the disease, as the damage once done cannot usually be repaired. As soon as any symptoms of disease are noted specimens should be forwarded for examination and report. It is well to remember that the whole principle of treating plant diseases rests on methods devised for the prevention of disease rather than the treatment of plants when once affected, and in no other connection can the proverb "Prevention is better than cure" be said to be more applicable than in the treatment of plant diseases.

In addition to work of this kind, which may be termed the ordinary routine work of the laboratory, the scientific staff is engaged in research dealing with the investigation of new diseases peculiar to

the country. For instance, Miss Doidge, M.A., F.L.S., has almost completed a study of a bacterial disease of mangoes prevalent in the Transvaal and Natal, while Mr. P. A. van der Byl, M.A., is busy with investigations dealing with the gumming of wattles, a red spot in cheese, and a black spot in butter, the two latter being caused by fungi.

The cultivation on a fairly large scale of a fungus which is parasitic on bagworms in the wattle plantations of Natal has been carried out in the laboratory, and some hundreds of cultures will be ready for distribution in September to a limited number of growers who have assisted in the work by supplying sacks of the insects as food material on which the fungus has been grown.

Another important and most necessary function performed by the Division is that of keeping itself up to date and informed in regard to plant diseases prevalent in other parts of the world, and of advising the Government as to what steps should be taken to prevent the introduction and spread of such pests into South Africa.

A special study is also being made of the fungi parasitic on the native plants and grasses and their inter-relationships to the introduced plants and crops. This comprises a study of the fungus flora of South Africa, and forms the greater part of the material stored in the herbarium alluded to above.

Specimens of fungi on native trees, shrubs, and other plants will always be gladly received from any correspondents who care to send such material to the laboratory.

# Recent Soil Investigation in the Cape Province.

By Dr. C. F. JURITZ, M.A., F.I.C., Chief Chemist, Cape Province.

(*Continued from page* 345.)

## OUDTSHOORN.

THE soils Nos. 182 to 186 represent an area on the Kansa Flats, which it had been proposed to bring under irrigation. The Director of Irrigation had previously been struck by the presence of hardpan close to the surface,* and, knowing the effect of this impermeable formation in other parts of the division, he had been very doubtful as to whether under the circumstances any portion of these flats was worth irrigating. Samples Nos. 182 to 185 represent the surface twelve inches of soil from different parts of the flats, and sample No. 186 was representative of the sub-soil of No. 183, the layer represented being taken at a depth of from 36 to 42 inches. In all, sixteen samples were collected from the four localities mentioned, but only

* *Vide* also "Agricultural Soils of Cape Colony," p. 96.

the five above referred to were subjected to actual analysis. All the sub-soils were very similar, consisting of hard "dorbank" or hard-pan. This hardpan appears to have been formed by the cementing together of the particles of soil by means of iron oxide and hydrate, in much the same manner as bog-iron ore is formed. No. 186, one of these sub-soils, contained also a large amount of carbonate of lime, and an appreciable amount of magnesia. The other sub-soils were, on the whole, free from lime. Even in the surface sample No. 182 a considerable quantity of "dorbank" (hardpan) was found, and in no case was the soil proper more than one foot deep. Soil in this condition would obviously be unsuitable for crops that require greater than twelve inches depth of soil more especially where, in consequence of the ground being level, the tendency would be to become water-logged.

Samples Nos. 187 and 188 were taken on the farm Vlakte Plaats in such a manner as to represent respectively the soils numbered 18 and 19 in the table on page 98 of my "Agricultural Soils of Cape Colony," an interval of eleven years having elapsed between the collection of the two sets of samples. As far as possible No. 187 represents the same soil that No. 18 represented, and No. 188 that of which No. 19 was a type. No. 187 is considered to be typical of the soil from the valleys amongst the mountains, and is described as a very rich virgin soil capable of producing magnificent potatoes, but after some years of cultivation decreasing in productiveness. No. 188 represented a virgin soil of Karoo type, very good for most crops except potatoes. Both samples were collected so as to represent the soil profile from the surface down to a depth of 12 inches. No. 187 was a dark, yellowish-brown soil apparently somewhat clayey. No. 188 was slightly lighter in colour, and had the texture of a good loam. The results of the usual agricultural chemical analyses were as follows:—

| No. | Percentage of Field Sample. | Percentage of Soil sifted through 1 mm. Sieve. | | | | Percentage of Soil sifted through ½ mm. Sieve. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fine Earth below ½ mm. | Water. | Organic Matter. | Chlorine. | Nitrogen. | Lime. | Magnesia. | Potash. | Phosphoric Oxide. |
| 182 | 70·4 | 1·73 | 3·17 | ·010 | ·084 | ·028 | ·066 | ·051 | ·070 |
| 183 | 89·4 | 1·19 | 3·83 | ·032 | ·112 | ·062 | ·024 | ·074 | ·064 |
| 184 | 93·5 | 1·62 | 3·88 | ·028 | ·093 | ·017 | ·087 | ·095 | ·090 |
| 185 | 95·5 | 1·17 | 2·97 | ·006 | ·077 | ·044 | ·120 | ·087 | ·106 |
| 186 | — | — | — | ·155 | ·070 | — | — | — | ·101 |
| 187 | 96·1 | 2·76 | 8·62 | ·0071 | ·259 | ·702 | ·143 | ·124 | ·086 |
| 188 | 93·2 | 2·54 | 6·44 | ·0064 | ·195 | ·700 | ·256 | ·185 | ·109 |

The percentages of certain water-soluble constituents of these soils were determined with the following results:—

| No. | Carbon Dioxide combined as Carbonates. | Sulphuric Oxide. | Total Soluble Salts. |
|---|---|---|---|
| 182 | ·005 | — | ·088 |
| 183 | ·010 | — | ·068 |
| 184 | ·006 | ·019 | ·074 |
| 185 | ·004 | — | ·092 |
| 186 | ·022 | ·065 | ·416 |
| 187 | — | — | ·068 |
| 188 | — | — | ·060 |

These percentages of alkali salts cannot be considered excessive. It appears that only the sub-soil No. 186 shows any considerable indications of brack, and that the six surface soils do not contain alkali in injurious amounts.

Partial mechanical analyses of the six surface soils resulted as follows:—

| No. | Pebbles, > 3 mm. | Gravel and Coarse Sand. 3–½ mm. | Fine Earth, < ½ mm. | Nature of Pebbles and Gravel. |
|---|---|---|---|---|
| 182 | 23·4 | 6·2 | 70·4 | Hardpan and quartz. |
| 183 | ·4 | 10·2 | 89·4 | Chiefly quartz grains. |
| 184 | ·7 | 5·8 | 93·5 | Quartz and hardpan. |
| 185 | ·4 | 4·4 | 95·5 | Almost wholly quartz grains. |
| 187 | ·33 | 3·61 | 96·06 | Quartz and fine-grained quartzite. |
| 188 | ·67 | 6·16 | 93·17 | |

As above remarked, the physical disadvantages of the Kansa Flats soils arise from the presence of the hardpan. In plant food content they are rather poor, being derived from the sandstones of the Uitenhage series which extend between the town of Oudtshoorn and Calitzdorp. Hence they do not exhibit the remarkable richness in plant food that is characteristic of so many of the Oudtshoorn soils; their resemblance is rather to the soils Nos. 3 and 14 (from Hazenjacht and the vicinity of Buffels Vlei) of the soils tabulated on page 98 of "Agricultural Soils of Cape Colony." Their percentages of nitrogen, potash, and phosphoric oxide may be described as middling, and in their lime content all the Kansa samples are remarkably poor. The plant food supply of the two Vlakte Plaats soils is far better, although in No. 187 there is a drop in the phosphoric oxide. It is most probable that the deterioration of the soil which is referred to above is due to the exhaustion of phosphoric oxide, and probably also of potash. The amounts of lime, magnesia, and nitrogen in these two soils are particularly high; in fact, both physically and chemically, the soils appear to be of fine quality and should give splendid results if the supply of plant food is not allowed to be depleted, but is continually replenished as fast as it is used up by the crops.

## PAARL.

Eight soils (Nos. 189 to 196) taken in the Paarl Division were hillside soils, and all of these, except Nos. 190 and 191, represent the continuous soil profile to a depth of two feet. Nos. 190 and 191 were taken similarly, but to a depth of three feet. None of these soils, except No. 195, had received any fertilizer whatever. Nos. 190, 191, and 192 had been delved during the present season, and Nos. 193 and 194 during the last one, to the depths to which the respective samples were taken. No. 189 represented a red, comparatively sandy, virgin soil on which proteas were growing, together with "schaap bos" and "slang bos." No. 190 was a similar soil, but dark brown in colour. No 191 was a yellowish and distinctly gravelly vineyard soil. Nos. 192 and 193 were taken from citrus orchards, and No. 194 from a pear orchard. Of these three orchard soils, No. 192 was very dark in colour, in fact, nearly black, friable, and evidently containing much organic matter. No. 193 was reddish-brown, and No. 194 light yellow, both being somewhat clayey in appearance. No. 195, a yellowish-brown soil, was fallow three years ago, then, for two successive years, it had been ploughed and sown with oats, guano and superphosphate being used as fertilizers at the rate of 200 lb. per acre. It was a loose soil, apparently less clayey than some of the others. No. 196 was a red fallow clayey soil containing hard lumps. No. 197 was a yellowish grey clay soil from an old dam, which was supposed to be very rich in fertilizing matter. It was evidently derived from decomposed slate.

One sample, No. 198, was collected on the farm Champagne, in the French Hoek District of the Paarl Division.

The following were the results of the general agricultural chemical analyses:—

| No. | Percentage of Field Sample. | Percentage of Soil sifted through 1 mm. Sieve. | | | | Percentage of Soil sifted through ½ mm. Sieve. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fine Earth below ½ mm. | Water. | Organic Matter. | Chlorine. | Nitrogen. | Lime. | Magnesia. | Potash. | Phosphoric Oxide. |
| 189 | 90·4 | 2·39 | 10·14 | ·021 | ·056 | ·006 | ·002 | ·004 | ·077 |
| 190 | 83·4 | 3·59 | 12·17 | ·048 | ·126 | ·013 | ·064 | ·006 | ·077 |
| 191 | 72·3 | 2·01 | 9·96 | ·017 | ·073 | ·008 | ·018 | ·004 | ·070 |
| 192 | 85·6 | 7·47 | 17·84 | ·039 | ·375 | ·006 | ·063 | ·023 | ·096 |
| 193 | 88·0 | 3·61 | 10·93 | ·013 | ·126 | ·042 | ·071 | ·015 | ·096 |
| 194 | 64·6 | 1·12 | 3·90 | ·008 | ·037 | ·006 | ·008 | ·005 | ·018 |
| 195 | 84·9 | 1·37 | 5·14 | ·017 | ·047 | ·020 | ·008 | ·004 | ·032 |
| 196 | 83·6 | 1·23 | 4·62 | ·017 | ·035 | ·010 | ·007 | ·005 | ·046 |
| 197 | 99·9 | 3·03 | 10·48 | ·019 | ·322 | ·058 | ·083 | ·135 | ·116 |
| 198 | — | 3·05 | 9·81 | ·0159 | ·014 | ·011 | — | ·021 | ·024 |

The percentages of total soluble salts in Nos. 189 to 196 were determined and resulted as follows:—

| No. | Soluble Salts. | No. | Soluble Salts. | No. | Soluble Salts. |
|---|---|---|---|---|---|
| 189 | ·100 | 192 | ·060 | 195 | ·068 |
| 190 | ·160 | 193 | ·044 | 196 | ·060 |
| 191 | ·032 | 194 | ·020 | | |

Partial mechanical analyses gave the following results:—

| No. | Pebbles > 3 mm. | Gravel and Coarse Sand. 3–·5 mm. | Fine Earth, < ·5 mm. |
|---|---|---|---|
| 189 | ·02 | 9·60 | 90·38 |
| 190 | ·40 | 11·20 | 88·40 |
| 191 | 17·14 | 10·56 | 72·30 |
| 192 | 2·45 | 11·03 | 85·62 |
| 193 | 1·75 | 10·25 | 88·00 |
| 194 | 20·44 | 14·92 | 64·64 |
| 195 | ·12 | 15·02 | 64·86 |
| 196 | 3·84 | 12·54 | 63·62 |
| 197 | Nil | ·10 | 99·90 |

The proportion of organic matter in most of the Paarl soils is considerable; in No. 192 it is exceptionally large, and quite naturally, this sample has a correspondingly high percentage of nitrogen. No. 197 is also rich in nitrogen. In Nos. 190 and 193 nitrogen is present in satisfactory proportion, and moderately so in No. 191. In the remaining five samples it is disappointing. In all ten soils lime is wholly inadequate, and—except in No. 197—potash likewise. Phosphates are normal in amount in No. 197, fair in Nos. 192 and 193, rather poor in Nos. 189, 190, and 191, and still worse in Nos. 194, 195, 196, and 198.

The proportions of chlorine and water-soluble salts are, in one or two cases, higher than the average for good soils, although, taking all circumstances into account, not harmful in these special instances.

## PORT ELIZABETH.

Nos. 199, 200, 201, and 202 were taken so as to represent the first, second, third, and fourth foot depth on the outspan about 100 yards from the Zwartkops hot water spring, each sample representing a 12-inch profile. The following determinations of water-soluble salts were made in the soil as sifted through a 3 mm. sieve, and are stated in percentages of the sifted soil:—

| No. | Sodium Chloride. | Total Water-soluble Salts. |
|---|---|---|
| 199 | ·019 | ·136 |
| 200 | ·020 | ·056 |
| 201 | ·027 | ·032 |
| 202 | ·028 | ·072 |

## PRINCE ALBERT.

On the farm Klein Kruidfontein, near Fraserburg Road Railway Station, the sample No. 203, a virgin soil from a valley, was collected. It represented an old river silt deposit, and was light chocolate in colour and of great depth, in some parts overlying shaly gravel. Ganna bos, karree bos, mimosas, and the usual Karroo bushes (sweet veld) grow in the vicinity. For fertilizing the soil kraal manure was generally used in the neighbourhood. The sample belongs to a good type of soil which should be well suited for all agricultural purposes. Analysis gave the following percentage results:—

| No. | Percentage of Field Sample. | Percentage of Soil sifted through 1 mm. Sieve. | | | | Percentage of Soil sifted through ½ mm. Sieve. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fine Earth below ½ mm. | Water. | Organic Matter. | Chlorine. | Nitrogen. | Lime. | Magnesia. | Potash. | Phosphoric Oxide. |
| 203 | 90·9 | 1·04 | 3·41 | ·012 | ·091 | ·852 | — | ·217 | ·115 |

This analysis is of interest on account of the few results hitherto obtained from soils derived from rocks of the Karroo geological system. To what extent the richness of these soils is due to the disintegration and decomposition of the dolerite which abounds in the Karroo, or to the calcareous tufa which forms so characteristic a feature of some parts of the country, and to what extent it is influenced by other factors I am not now prepared to discuss, but, in the absence of fuller investigations it may be interesting here to compare the above figures with results of other Karroo soils published in "Agricultural Soils of Cape Colony"; I therefore adduce the following:—

| Locality. | Nitrogen. | Lime. | Potash. | Phosphoric Oxide. |
|---|---|---|---|---|
| Beaufort West ... ... ... | ·196 | ·356 | ·300 | ·114 |
| Graaff-Reinet ... ... ... | ·154 | 1·148 | ·300 | ·079 |
| " ... ... ... | ·231 | 1·288 | ·318 | ·072 |
| " ... ... ... | ·175 | 1·364 | ·318 | ·073 |
| Richmond ... ... ... ... | ·245 | 1·744 | ·242 | ·106 |
| " ... ... ... ... | ·231 | 1·574 | ·269 | ·092 |

As for the soil represented by No. 203, with a fair amount of nitrogen and a satisfactory proportion of phosphates and potash, it combines a good supply of lime, and the Government Agriculturist, Mr. R. W. Thornton, now principal of Grootfontein School of Agriculture, who had also inspected the soil, pronounced it "excellent for all crops, especially for lucerne," an opinion borne out by the fact that cereals and lucerne had been cultivated most successfully on soil of the nature typified by the sample.

The percentage of water-soluble salts in this soil was found to be .212, from which one may infer that it should not prove too brack for cultivation, unless drainage be faulty and an unanticipated layer of alkali salts in the lower soil levels be raised to the surface by irrigation.

(*To be continued.*)

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# On the Economic Value of Wild Birds.

By Dr. E. WARREN, Director, Natal Museum.

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IN this brief article it will be shown that bird-life is of the utmost importance in the economy of Nature, and that its due preservation and encouragement are matters of vital interest to all agriculturists, stock-breeders, fruit-growers, and gardeners.

It is true that certain birds at some seasons of the year may be seen eating fruit and doing a considerable amount of mischief; but the hasty conclusion that the birds should be destroyed will be found on closer consideration to be fallacious and liable to lead to disastrous results.

Some birds are of more economic value than others, but those which take their annual toll of fruit or grain have themselves been instrumental in permitting the crops to grow by the destruction of insects and other vermin during the remainder of the year.

Birds being exceedingly active creatures, and their body temperature being higher than that of any other vertebrates, require, relative to their size, an exceptionally large quantity of food.

The food is very various in nature, ranging from snakes and small mammals to insects of almost microscopic proportions, and in the vegetable world seeds, berries, etc., are consumed.

Mammal-vermin, such as rats and mice, and destructive insects are capable of multiplying to an alarming extent, and the great value of birds in acting as a natural check is being conclusively proved wherever the subject has been investigated. It is found that near towns, where the birds have been more especially persecuted and driven away, the growing of fruit and other market produce has become increasingly difficult, or even impossible, owing to the prevalence of fruit-fly and other insect pests.

In the United States of America careful investigations of the nature of the food of many kinds of birds have been made. The contents of the stomach have been examined, and in the great majority of cases the food is shown to consist of just those kinds of insects, ticks, wireworms, etc., which constitute a menace to the stock-farmer, agriculturist, and market-gardener.

Observations have also been made on the feeding of nestlings by the parent birds. The appetite of the young is truly prodigious, and every few minutes throughout the day one or other of the parent birds returns to the nest with food, which is generally of the nature of an insect such as a caterpillar, fly, or beetle. Many fruit-eating birds feed their young solely on insect-food, and thus certain birds, which to a casual observer might be regarded as wholly harmful to the farmer, have been instrumental during a considerable portion of the year in protecting the crops from being overrun with insect-vermin.

It may safely be asserted that bird-life taken as a whole is of the utmost economic value to the farmer, and in his own interest it behoves him to encourage it on his land.

Native children with their traps and European youths with catapults and air-guns often work destruction on the farmers' best friends, and every possible means should be taken to prevent this waste which may lead to a very marked lessening in the beneficial results which accrue from the presence of birds.

Birds, in fact, act as a very efficient police-force which is never off duty, but is ever searching for insects on the leaves of plants and for destructive grubs at the roots.

There is no doubt that the agriculturist is only beginning to realize the great importance of birds; and through hasty observation he has often been an active agent in reducing his crop by the destruction of birds which were apparently doing mischief. Storks, herons, ground hornbills, and other birds have been seen to uproot young plants, and they have on this account been summarily condemned and shot. These birds are searching for destructive beetle and other grubs at the roots of the plants, and they possess the remarkable faculty of locating such grubs. The young plant may apparently look healthy, but the bird in some unexplained manner discovers that there is a grub at the roots, and the loss of the plant is more than compensated for by the grub being removed and eaten by the bird.

In many districts there is a great paucity of bird-life, and this is not wholly due to the direct killing by natives, European lads, or the occupiers of the land. The scarcity is largely due to man's indirect influence. The lack of cover and the widespread grass fires are very prejudicial to bird-life. In most European close-settled countries the agricultural land is covered with a regular network of more or less wide hedgerows, along which trees are very frequently scattered. Such hedgerows form admirable cover for birds, and to their presence the relative abundance of bird-life, in districts where the human population is relatively dense, is very largely due.

Farmers in this country would do well to consider more carefully the needs of the birds. Strips of the bush should be especially reserved as cover, and where bush is scarce it would pay to plant strips of native trees and shrubs; but, of course, care would have to be exercised that the plantations should be placed in such situations as would permit their proper growth. There can be no doubt that clearing the bush to form agricultural land can soon be overdone, and on many farms there is practically no cover, and scarcity of the more valuable birds is the result. The planted belts would have to be sufficiently wide to enable them to resist the grass fires which are so general in Natal and other parts of South Africa.

The advisability of burning the grass is, however, extremely doubtful, and Professor Bews has shown in a recent number of the

"Annals of the Natal Museum" that grass-burning leads to a deterioration of the veld and the growth of the coarser and less valuable species; but this is scarcely the place to combat a practice which is so largely followed both by Europeans and natives.

We will now pass in review a few of the more important birds which possess a high economic value to the agriculturist, but it must be remembered that many birds not mentioned are nevertheless of great value, and that, speaking generally, the very great majority of birds perform an invaluable function which far outweighs the value of the grain or fruit which some may consume at certain seasons of the year. In orchards when the fruit is ripening and in newly sown land it would undoubtedly pay the farmer to employ a few natives to frighten away the birds rather than to destroy them. In the majority of cases fruit-eating birds are only destructive to the fruit for a comparatively limited period, while during the remainder of the year their presence is in every way beneficial.

The owls are extremely valuable birds to the farmer, they feed on mice, moles, rats of all kinds, and on insects. They seldom attack chicken or other birds. The loss to the farmer caused by rats and mice, both in the granary and on the field is sometimes exceedingly great. Small mammals are the favourite food of the larger owls, and on no account should these birds be shot. The best known of the owls are the barn owl, the grass owl, the bush owl, and the eagle owls which have tufts of feathers on each side of the head, and are sometimes called eared owls.

The kestrels, of which perhaps the South African kestrel (*Cerchneis rupicola*) is the best known, are also valuable birds in that they consume large quantities of locusts, termites or white ants, and other large and destructive insects.

Game birds generally, such as quails, partridges, francolins, korhaans, guinea-fowls, pauws, etc., are all of the greatest value. Messrs. A. Haagner and R. H. Ivy, in their "Sketches of South African Bird-life," quote Mr. Thomsen, of the former Transvaal Agricultural Department, as saying that not only do they devour mature locusts, but they scratch up and eat the eggs. Termites and other insects are devoured in large numbers. They are also useful in eating weed-seeds in large quantities. The reckless shooting of game birds is greatly to be deprecated by all agriculturists; they are of far more use alive than in swelling the bag of the sportsman.

The coucals or vlei lourie are most valuable insect-eaters.

All woodpeckers and barbets are of very special value. They build in decayed tree-trunks, and throughout the day they search for insects hiding in the crevices of the bark of trees. Such insects are often most injurious to the growth of the tree, and every possible encouragement to these birds should be afforded by all orchardists and foresters.

The buntings (streepkopje), wagtails (kwikstertjes), sugar-birds (suikervogels), sunbirds, warblers, chats (bontrokje, spekvreter, dagbreker, etc.), flycatchers, cuckoo-shrikes, and swifts are all true insect-eating birds and should be carefully preserved.

The hoopoes, of which the best known is the South African hoopoe, which is reddish brown in colour with black and white wings, and characterized by the possession of a large erectile crest on the head, are most useful birds in the orchard.

The nightjars or goatsuckers (nachtuil) also deserve special mention. They are owl-like birds of medium size and possess an enormous gape to the mouth. They fly very silently in the dusk of the evening and feed on flying insects, such as mosquitoes, small moths, etc.

The brilliantly coloured rollers also consume large quantities of noxious insects. All cuckoos are most useful birds.

Special mention must be made of the so-called locust-birds. They are birds belonging to very different families, but may be grouped together, from the farmer's point of view, on account of their utility in devouring large numbers of locusts, crickets, etc. The birds are:—(1) The European white stork (*Ciconia ciconia*), which migrates to South Africa; (2) the white-bellied stork (*Ciconia nigra*); (3) two species of pratincoles (*Glareola pratincola* and *G. melanoptera*), which are pale buff in colour with long pointed wings like those of a swift; and (4) the wattled starling or klein springhaan (*Dilophus carunculatus*). To these might be added the hadadah ibis (*Hagedashia hagedash*). This bird is shot for food in some districts, but its value as an exterminator of locusts and other insects is so great that the bird should be strictly preserved.

Plovers and lapwings follow the plough and pick up destructive beetle-grubs from the newly turned furrows.

Water-birds such as storks, egrets, ducks and moorhen feed largely on fresh-water crabs and other creatures which devour the spawn of fishes, and they also help to keep the rivers and ponds clean and wholesome.

The larger and handsomer birds, such as the cranes, the secretary bird and the ground hornbill, are both ornamental and useful. The two latter birds feed largely on snakes, and although they will devour young quail and eggs, yet undoubtedly they are most valuable in destroying dangerous reptiles and large beetle-grubs.

The so-called seed-eaters, which are small birds resembling the Cape canary, and include such birds as geel-seisje, dikbek-seisje, are also of value. They subsist chiefly on weed-seeds and insects, and the result of their presence being a considerable reduction in the number of weed-seeds cannot but be of value to all cultivators. This group includes the chief singing birds of the country.

From careful observation it is certain that there are very few birds which are prejudicial to the farmer's interests. The large eagles may kill lambs, and the smaller birds-of-prey (such as kites, buzzards, and sparrow hawks) will carry away chicken; but some of the kites subsist almost entirely on rats, reptiles, and insects, and the good work accomplished in destroying vermin more than counterbalances the loss of a few young chickens.

The birds which are more destructive than any other to ripening fruit are the bulbuls (geelgat), the mouse-birds (muisvogel), and the pied starling (spreeuw).

We have now seen that birds constitute a most valuable protective force against the inroads of destructive creatures such as snakes, rats, mice, moles, insects of all kinds, ticks, wireworms, etc., while many of the seed-eating birds subsist almost entirely on the seeds of troublesome weeds.

To protect birds in the farmers' interest, and to preserve from extinction some of the most exquisite creatures on earth, a Plumage Bill has been recently introduced in the English Parliament.

It is undoubtedly high time that the ruthless destruction of plumage birds for the supply of the milliner should be ended by all civilized countries, since many of the more beautiful species of humming-birds, birds-of-paradise, etc., are nearing extinction through the wholesale destruction by collectors.

There has been some misapprehension by certain people with regard to ostrich feathers. These are specifically excluded from the operation of the Bill, and incidentally it may be noted that the ostrich feather trade would be benefited by a greater demand.

South Africa is not without some charming examples of bird-life, such as the honey-eaters, sunbirds, bee-eaters, orioles, cuckoos, plantain-eaters, kingfishers, egrets, flamingos, ibises, etc.; and from an aesthetic point of view, in addition to the utilitarian aspect, the landowner should do everything in his power to preserve such beautiful examples of living creatures.

In conclusion, it may be said that, from a purely practical aspect, it behoves all stock-farmers, agriculturists and gardeners to take active steps to encourage bird-life; and much may be accomplished by providing adequate strips of bush for cover, and by resolutely preventing the killing of birds.

# The Production of Cigar Wrapper Tobacco.

By W. B. WILSON, B.S.Agr., Officer-in-Charge, Barberton Experiment Station, of the Tobacco and Cotton Division, Pretoria.

## INTRODUCTION.

THE growing of tobacco of one class or another has been practised by the farmers of South Africa for a number of years; but it is not chronicled that anything suitable for cigar wrappers was among those classes. This is probably due to the fact that the heavy tobacco was more easily produced in primal days—it being less affected by hail, rains, haphazard handling, and crude sheds for curing—and that the market within reach demanded largely the heavier article suitable for strong pipe and snuff.

Although tobacco has been grown in South Africa for many years, it is only within the last ten or twelve that its commercial value to the country was realized and anything like an attempt to produce it on a large scale was begun. Even to-day South Africa is not able to supply the local demand for some of the different classes. With

this demand and the increased interest in tobacco growing, we see the approach of the production of cigar wrappers, which, with the increased output of Natal cheroots, promises to be in fair demand, as at present practically all wrapper leaf is imported.

For the imported article the manufacturers pay 1s. or more per pound, plus carriage and 3s. duty. These facts indicate that good prices could be realized for wrapper leaf which will fulfil the requirements of the trade. What are the possibilities and probabilities of growing this article? The question is best answered by citing what has been done at the Barberton Tobacco and Cotton Experiment Station.

Last year with a poor season and no irrigation, we produced under cheese-cloth shade, with about 80 per cent. of a stand, 795 lb. of cured leaf. This yield is not high, but considering the imperfect stand and drought it is fair. Besides this, we grew a small plot in the open, which we thought on account of lateness would do no good, but it gave a small percentage of saleable wrappers. Now we can say we have produced splendid wrapper under cheese-cloth and fair quality in the open.

This year the crop consists of one acre under cheese-cloth and four in the open. It is estimated that the crop will yield 1000 lb. per acre.

## CIGAR TOBACCO CHARACTERISTICS.

Cigar tobacco, in general, is of three sorts according to the use to which it is put, viz., filler, binder, and wrapper; and each of these is graded according to colour, body, quality, and length.

In the production of cigar wrapper tobacco a certain percentage of the leaves grow too coarse to be used for "wrapper," and they are used for "binder," and some of the inferior leaves are used for "filler"; so that in producing wrapper you also produce filler and binder. Different soils and climates as well as different varieties tend to make a predominance of one or the other sorts.

Sumatra and Florida Cuban are "wrapper" varieties, and frequently produce as much as 80 per cent. of wrapper, and the rest is used for binder or filler. Those leaves of Sumatra used for filler are not prized as such, but are used to prevent waste. The chief value of Sumatra tobacco lies in its thin but tough elastic leaf, the absence of any strongly marked taste or aroma, and the fine finished appearance it gives a cigar. The absence of any strongly developed taste permits it to be used on all grades of cigars, from fine Havanas to Natal cheroots, without appreciably changing their respective flavours.

Florida Cuban leaf produces a very valuable wrapper, usually a little thicker and more aromatic than the Sumatra leaf. The leaves of Cuban tobacco not suitable for wrappers are more desirable for filler purposes than those of the Sumatra variety.

Connecticut Broadleaf, Havana Seed, and Zimmer Spanish are binder and filler varieties, although a few fine wrappers are occasionally found in a crop of Broadleaf. Broadleaf wrappers are dark and rather coarse, and were a few years ago used very extensively by the trade; but at present are used to a very limited extent. This decrease in the use of Broadleaf is not because it has deteriorated in quality, but because of the change of the public taste in preferring a cigar wrapped with Cuban or Sumatra leaf, and because it is more economical, as the thinner Cuban and Sumatra leaf wraps so many

Plate No. XXXVII. SUMATRA TOBACCO UNDER CHEESE-CLOTH, SHOWING THREE WEEKS' GROWTH. [Photo by Byerley.

more cigars per pound of tobacco. Havana Seed leaf is also very little used as wrappers, while Zimmer Spanish is practically never used as such.

The burning quality is a very important character of cigar tobacco and applies to all sorts alike. It should burn freely with a clear firm ash, and retain fire well. The wrapper should not crack, curl, nor char in advance of the fire.

It must not be understood that quality in one sort of leaf means quality in that same leaf if used instead of another sort; or quality if used for one purpose does not mean quality if used for another purpose. Good colour and body in a filler leaf may disqualify it for wrapper purposes; and vice versa, quality in a wrapper leaf does not mean that that leaf is any good for filler or binder purposes. In fact, quality in the two cases refer to quite different properties—the properties that make a good binder being very similar to those that make a good filler.

As stated above, the soil and climate have a very decided effect upon the tobacco. In Cuba, where the finest cigar tobacco in the world is produced, its characteristics vary in different parts of the island. In Santa Clara, practically no wrapper is produced, the tobacco being heavy and aromatic; in Pinar del Rio, a small percentage is used for wrapper; all the tobacco being lighter than that of Santa Clara District. In the Province of Havana a very large percentage is used as wrapper and highly prized as such.

At the Barberton Station Sumatra has given the best results; Shamel's Hybrid ranking next, and Florida Cuban being rather inferior. We are trying the variety, Halladay's Hybrid, this year for the first time. It promises to be a good variety to grow, resisting well the attack of root gallworm, a weak point with Shamel's Hybrid.

The cigar filler, used for the manufacture of cigars in this country, is mostly grown in Natal. The quality of this tobacco, as compared to Cuban, is as yet poor, but it has improved rapidly in the last few years. and through further improvement Natal may become the filler producing section of South Africa.

## PRODUCTION OF SHADE-GROWN CIGAR WRAPPER TOBACCO.

By "shade-grown" we mean tobacco grown under artificial shade (Plate XXXVII).

As to comparative quality, only data referring to this country concerns us here, and the work determining this being at present in hand and touched on already, it will be interesting to note here the origin and development of the shade-grown methods; to which can be appended the cost of erecting an acre tent for our experiments.

The idea originated in Florida, United States of America, about 1896. It was noticed that Sumatra tobacco grown near trees, where it had been partially shaded, was superior in quality to the rest of the field. Experiments were then begun to produce tobacco under artificial shade.* The first method of shading was with lattice work, which produced good results, but on account of ease of erecting, openly woven cotton cloth has replaced the lattice work. After a few years of successful work in Florida, the idea was taken up by the United States Department of Agriculture and tried in the northern districts. The results are well known, and the growing of cigar tobacco under artificial shade has become an industry in itself.

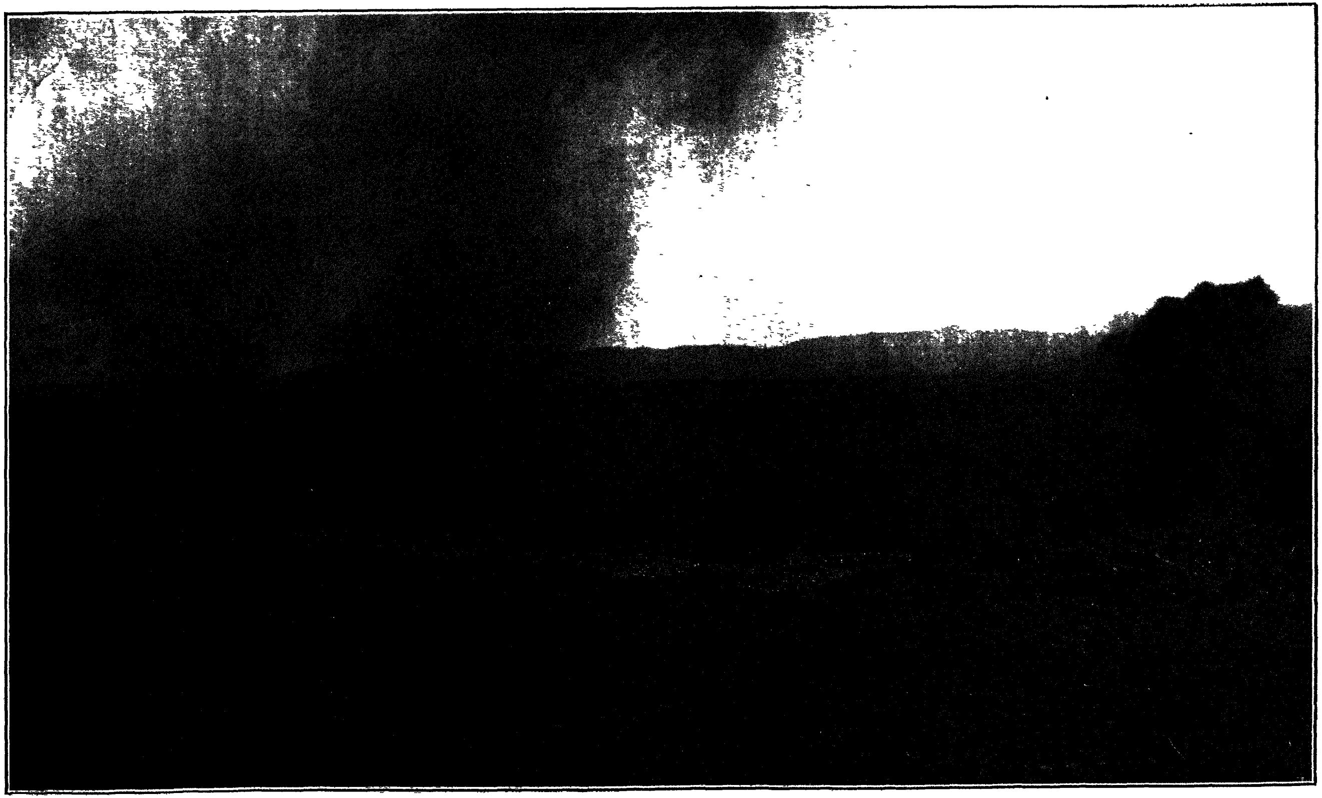


*Plate No. XXXVIII.* BURNING SEED BED. [*Photo by Lee.*

The following is the cost at Barberton of erecting an acre tent, consisting of cheese-cloth, wire, and wood posts; all labour calculated at 1s. 3d. per day of ten hours:—

| | £ | s. | d. |
|---|---|---|---|
| *Labour.* | | | |
| Making holes for posts | £0 | 17 | 6 |
| Setting posts | 0 | 7 | 6 |
| Stretching wires | 0 | 10 | 0 |
| Putting on cloth | 4 | 0 | 8 |
| Total | £5 | 15 | 8 |
| *Material.* | | | |
| Twine | £0 | 17 | 0 |
| Half-dozen needles | 0 | 0 | 6 |
| Staples | 0 | 2 | 1 |
| *One-fifth of 78s. 6d., cost of wire | 0 | 15 | 8 |
| *One-fifth of 350s., cost of posts | 3 | 10 | 0 |
| *One-fifth of 36s., cost of brace-blocks and wire | 0 | 7 | 2 |
| *Half of £60. 2s. 3d., cost of cheese-cloth | 30 | 1 | 2 |
| Total | £35 | 13 | 7 |
| Total labour | 5 | 15 | 8 |
| | £41 | 9 | 3 |

## SELECTION OF SOIL.

In producing good cigar wrapper tobacco, the first and one of the most important considerations is the selection of the soil. It must be well drained, sweet, fertile, and light in physical texture, a fertile loam or sandy loam being preferable to a clay loam. If it is not naturally fertile, it must be made so by the application of manures.

The soil that has been giving good results at our Barberton Station is a light, red sandy loam with a fair amount of organic matter, and also richer in plant food than the average soil of the locality. This land has been cropped a number of years.

In general it would not be wise to attempt to grow tobacco on most new land, as it is often sour, which would be fatal to the crop, and even if it were not sour, a good tilth could hardly be acquired, and a poor tilth would have a detrimental effect upon the quality of the leaf; as the plant food is not readily available on newly broken veld, and the plant becomes stunted through slow growth. If for any reason one must use tobacco as the first crop on virgin veld, a good rule to follow would be to plough the land just after the midsummer rains and cross plough just before the end of the rainy season, this time making a heavy application of slaked lime if the soil is very porous or clayey, then let it lie fallow through the winter, and work it up thoroughly early in the spring.

Another very determining factor in the selection of the soil is the water supply. Irrigation should be available, because the rain cannot be depended upon at any time of the year. The plants should

* NOTE.—One-fifth and one-half of the total cost is reckoned, as the material, i.e. wire, etc., and cheese-cloth lasts for five and two years respectively.

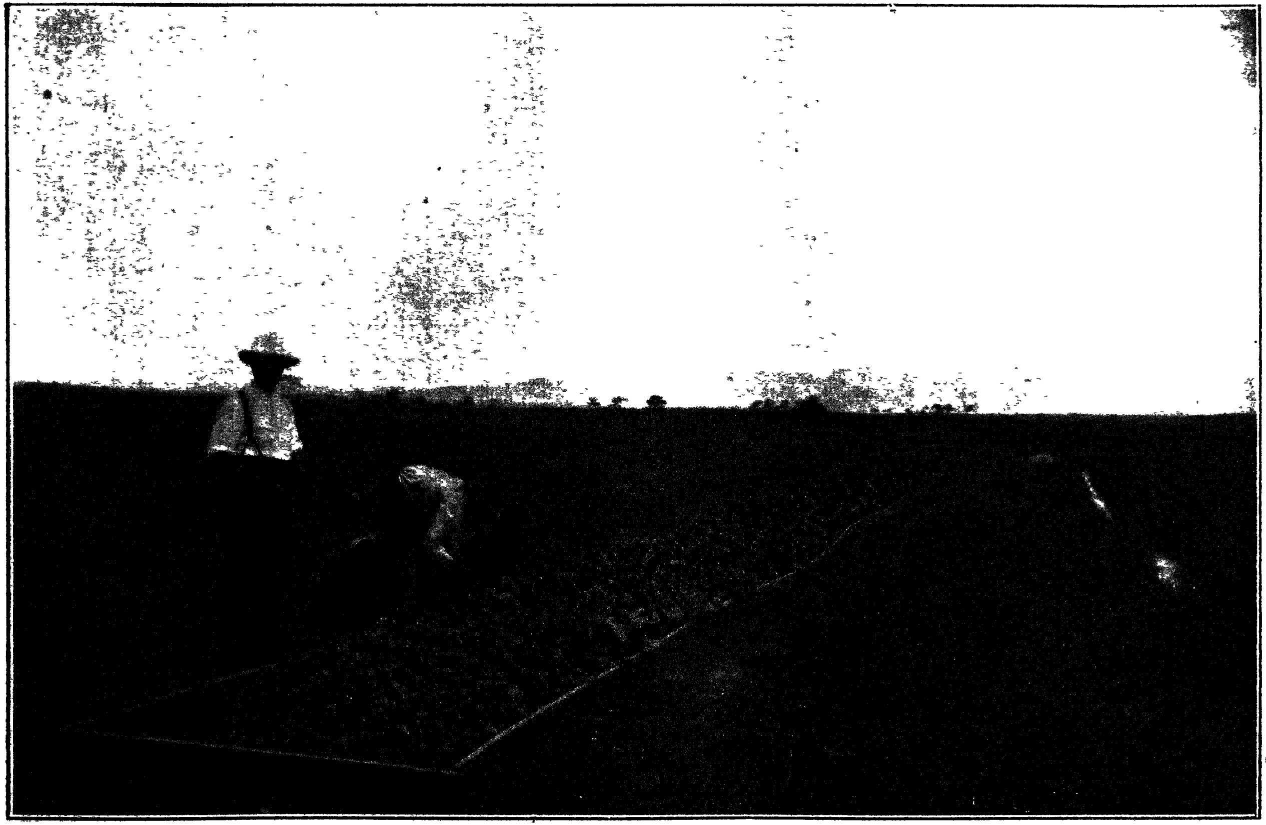


*Plate No. XXXIX.* TOBACCO SEED BED: DRAWING PLANTS FOR TRANSPLANTING. [*Photo by W. B. W.*

be transplanted when they are the proper size, and this cannot be done without water.

Tobacco cannot, as a rule, be successfully grown on the same soil year after year on account of root gallworm, and care should be taken never to plant tobacco on land badly infested with this pest. For the same reason, tobacco should not follow such crops as tomatoes, cabbages, or potatoes in a rotation.

Having selected a suitable soil the next step is to prepare the seed beds.

### SELECTION OF SITE FOR SEED BEDS.

The seed beds should be as near as possible to the land on to which the seedlings are to be transplanted. They should be, if possible, situated near water, so that they may be more conveniently watered with a watering-can. The same kind of soil that is to grow the plant to maturity will produce the seedlings, though it may be necessary to fertilize more heavily (for this purpose any complete fertilizer may be used).

It is necessary that a warm place be selected, and it is important to select a place sheltered from the drying August winds which usually come from the north. In the Barberton District frost does not often appear after the 15th July, but if it should happen to come and the plants are covered they will not be damaged. Cheese-cloth, or a light covering of grass, will be sufficient to protect the young seedlings during the cold nights.

### PREPARATION OF SEED BEDS.

To prepare the soil for the seed beds, clear off all grass, weeds, and other rubbish and dig up the soil to a depth of 4 or 5 inches without turning it over. Then cover the bed with stalks, brushwood, and waste; and set fire to it (see Plate XXXVIII). Have sufficient fire to kill all weed seeds, insects, and insect eggs. A good way of determining when the soil has been sufficiently heated is to bury in the bed a medium-sized potato to a depth of 3 inches, and when it has cooked the soil is well burned. After burning in this manner, allow the plot to cool, remove all chunks and unburned material, but do not remove the ash—dig the ash in, thoroughly mix it with the soil, and work to a thorough tilth to a depth of about 3 inches. Rake off all of the clods and have the soil fine and the surface even. The plot is now ready for sowing. The beds should be sown in strips any length, but not more than 4 feet wide, leaving a path 12 to 15 inches between each bed. If the bed is sown in one large plot it cannot be watered, nor plants drawn from it, without tramping it and destroying the plants.

To sow the seed, thoroughly mix them with one quart of sieved wood ashes and sow the mixture evenly over the bed. Sow over the bed several times so as to get the seed evenly distributed. The rate to sow the seed is one ounce per 1000 square feet. After the seed is sown, cover it lightly with fine soil, then cover the bed with cheese-cloth stretched over it, or cover the bed with grass, held a few inches above the soil with a frame work, so as to afford protection against the hot sun. Cheese-cloth is best, as it helps to keep insects off of the young plants. The bed should be boxed in on the sides and ends with 6-inch boards or poles to stretch two-ply of cheese-cloth

over. When plants are the size of a shilling one ply should be removed, and later the other one removed in day time, but put on again at night. Similarly with grass, remove it entirely when plants are about the size of a two-shilling piece. Cheese-cloth should be put over the bed at time of sowing the seed, but if the season is dry, it requires more water and attention to keep the bed moist than it would if grass is used. It is very necessary to keep the bed moist until germination is complete, for, just at that time, the plants are very easily killed. When the plants are the size of a shilling, the amount of water should be reduced in order to toughen them.

The area of seed beds which one will require is easily calculated by reckoning 15 square yards for each acre of tobacco to be grown; making allowance for any accident that may happen to the seed beds and for the filling in of vacancies caused by the hot sun and insects. If plenty of plants are available, only the best need be used, and results will be much more satisfactory.

The time to prepare and sow the seed beds is from July to September. They may be prepared late in June, but unless the season is very early this would not be worth while.

### PREPARATION OF SOIL AND FERTILIZATION.

After the seed beds have been sown, it will be about ten weeks until transplanting time. During this interval, the soil should be thoroughly prepared. The ploughing should be 8 to 10 inches deep, and as soon after the sowing of the beds as possible. This enables the plant food to become more available. It also produces the germination of weed seeds so that they may be destroyed before the crop is transplanted, thus making cultivation easier. To destroy these weeds, a flat or disc harrow should be used—this also keeps a mulch on the soil and preserves the moisture.

If fertilizer is to be used it should be applied to the land during these workings. The use of stable manure is not advised unless it is well rotted, and must then be applied before the land is ploughed. To make a complete fertilizer the stable manure should be supplemented with sulphate of potash and phosphoric acid.

The potash and phosphoric acid may be put on any time before the tobacco is transplanted. If a ready mixed commercial fertilizer is used, it should contain 10 per cent. of phosphoric acid, 4 per cent. nitrogen, and 10 per cent. to 12 per cent. of potash. This may be applied broadcast at the rate of 800 lb. per acre, or in the row at the rate of 400 lb. per acre. Broadcast is best for intensive and continued cultivation, but row application is more economical if only immediate returns are wanted. If the fertilizer is applied broadcast, it may be sown by hand and disked in; if it is applied in the rows, open the furrows and put in the fertilizer and then run a small scarifier in the furrow to mix it with the soil. The furrow may then be used as the irrigation furrow if it has been laid off with a proper fall.

The land is now ready for the transplanting of seedlings.

### TRANSPLANTING.

The plants are ready to be transplanted when they are about 6 inches high and the stalk as thick as an ordinary lead pencil (see Plate XXXIX). The time that the plants will reach this stage is well

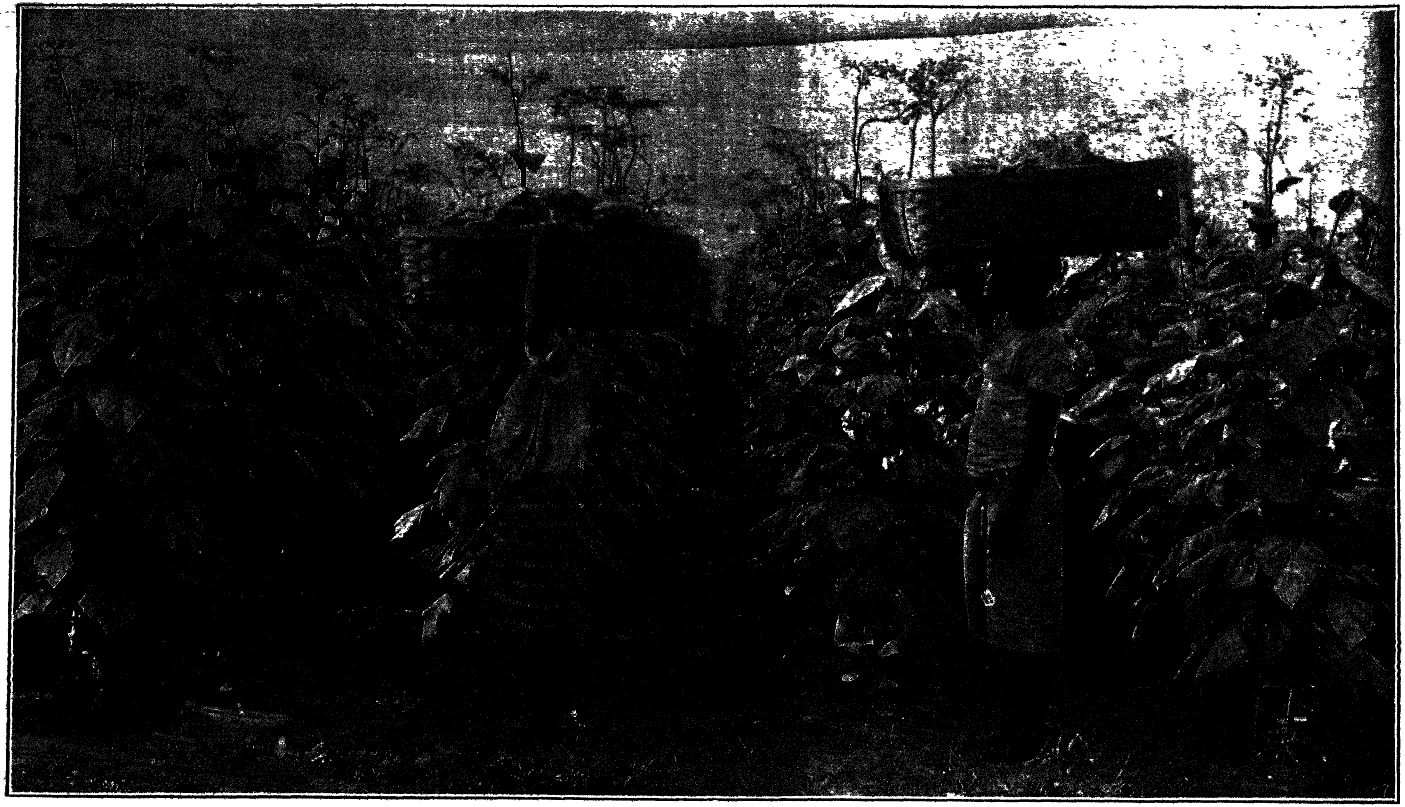


*Plate No. XL.* HARVESTING. *[Photo by Byerley.*

Taking the first priming from Sumatra Tobacco. Grown under cheese-cloth.

*Plate No. XLI.* HARVESTING. *[Photo by Byerley.*

Taking the second priming from Sumatra Tobacco. Grown in the open.

worth reckoning, in order that they may be ready at the best season. Last year our best crop was obtained from October and early November transplanting. This year our November and December transplantings gave best results. This year, however, our rains were late, and to this we attribute the failure of the October transplanting. No fixed date can be set down as the best time for transplanting; but the plants should be ready so that transplanting may be done as soon as the spring rains have begun. Seed beds sown the last of July should produce plants ready for transplanting by the middle of October.

For the work of transplanting, rainy cloudy weather is desirable, but if it is not at hand, the work must be done with irrigation. Here is the advantage of having the seed beds close to the tobacco lands. The plants can be taken out a few at a time and transplanted immediately. Much labour will be saved, and a much larger percentage of the plants will live than would if they are transplanted in quantities after having been hauled long distances before transplanting. The seed beds should be thoroughly watered before the plants are drawn to prevent breaking off the young roots.

When the sun is very hot it will be found necessary to shade the transplants and to irrigate twice a day for a few days. When it is necessary to cover the plants after transplanting we have found that a very good and convenient method is to take long, straight clean veld grass and lay over the plants lengthwise with the rows so as not to interfere with the flow of water while irrigating. After the plants have taken root, the grass should be removed and the plants watered just as little as possible to keep them thrifty.

Too much care cannot be taken at transplanting time to put every plant in properly, and have every one a good one. Sometimes the tap root is long and is put into the soil doubled up; sometimes the stalk will be infested with splitworm or the roots with nematode; such plants will never do well. A little attention given to selecting and discarding such plants will save labour and make a more uniform and better crop. The correct distance to give cigar tobacco when transplanting is very important. Much work has been done on this question, and it appears that 4 feet by 15 to 18 inches are about the correct distances.

### CULTIVATION.

Cultivation has a very great deal to do with the making of quality in the tobacco. One cannot cultivate too often up to a certain stage. As soon as the plants have taken root, about seven days after transplanting, they should be cultivated. If transplanting has been done during a wet period, or after a rain, a better plan is to cultivate as soon as the soil is dry enough. Sometimes this is only one or two days after transplanting. This first cultivation may be 4 or 5 inches deep, not close to the plants, but if the soil has been well prepared and not tramped during transplanting, shallower cultivation is better. After ten days or two weeks from transplanting all cultivation must be shallower. Second and third cultivations should be close to the plants, throwing the soil well up around them, so as to prevent them from blowing over. After this, the cultivation should not be close to the plants, and it should cease when the plants are from 2 to 3 feet high. Kaffir hoes should be used to keep down the weeds and to form a mulch between the plants.

## PESTS.

Thus far the only pest that has been a serious drawback to the cultivation of tobacco in the Barberton District is the root gallworm, and as yet no remedy is known. Preventive means, such as rotation of crops, is the only way to mitigate its attacks. Well sterilized seed beds will produce plants free from it, which is a great help towards keeping the lands clean, and also assists in producing a crop on infested land.

Cutworms (mestworm), grasshoppers, millipedes, and splitworms are other pests encountered. Cutworms may easily be got rid of by the use of poisoned bait if noticed in time, but they are better avoided by not letting weeds and grass grow on the land where tobacco is to be planted for at least two months before transplanting.

There are two kinds of grasshoppers that sometimes do considerable damage to tobacco by eating the leaves. These are the elegant and green grasshoppers, both of which must be kept in check, as a few holes spoil a leaf for wrapper purposes. This has, so far, been done by hand picking, as they have not yet occurred in great numbers, and as they are rather conspicuous they are easily found. The green one is the more elusive of the two, it being the same colour as the leaf, and it also does the greater damage.

Millipedes did some damage last year and had to be picked and destroyed. These worms were found coiling round the stalk and eating a ring into the bark. They seldom eat through the stalk, but they eat sufficiently deep to cause it to break during a light wind.

Splitworms did some damage this year in the seed beds by boring into the stalks just above the ground. This is best prevented by covering the seed beds at night with cheese-cloth, and thus preventing the moths from depositing eggs on the young seedlings.

## TOPPING AND SUCKERING.

If Sumatra tobacco is topped, it should be done just as the bud of the flower shows, then twenty to twenty-eight leaves should be left on each plant. About two weeks after this, the suckers will have to be removed from the axle of the leaves. The latest approved method of producing fine wrapper tobacco, however, is to leave the tops on the plants. This method gave good results last season, though no direct comparison has been made here to determine whether better cigar wrapper leaf is produced by leaving the flower heads on the plants or by breaking them off.

## HARVESTING.

This should be done by priming, i.e. picking off the leaves as they ripen, from the bottom of the stalk upwards. Picking should usually begin just after the plants come into flower (see Plate XL). The proper condition in which to pick the leaves is told by the feeling and appearance of them. Exactness in determining the correct stage of ripeness is best acquired by experience, as all plants that are ready to harvest do not look alike, but, in general, the leaf will have a dull appearance and feel thick and leathery, sometimes showing faint yellowish flakes. These flakes are very characteristic of the top leaves, but are often indistinct on the lower leaves, so that if one waits for them to become distinct before he begins picking, the bottom and middle leaves will be over ripe. The middle leaves of the plant are

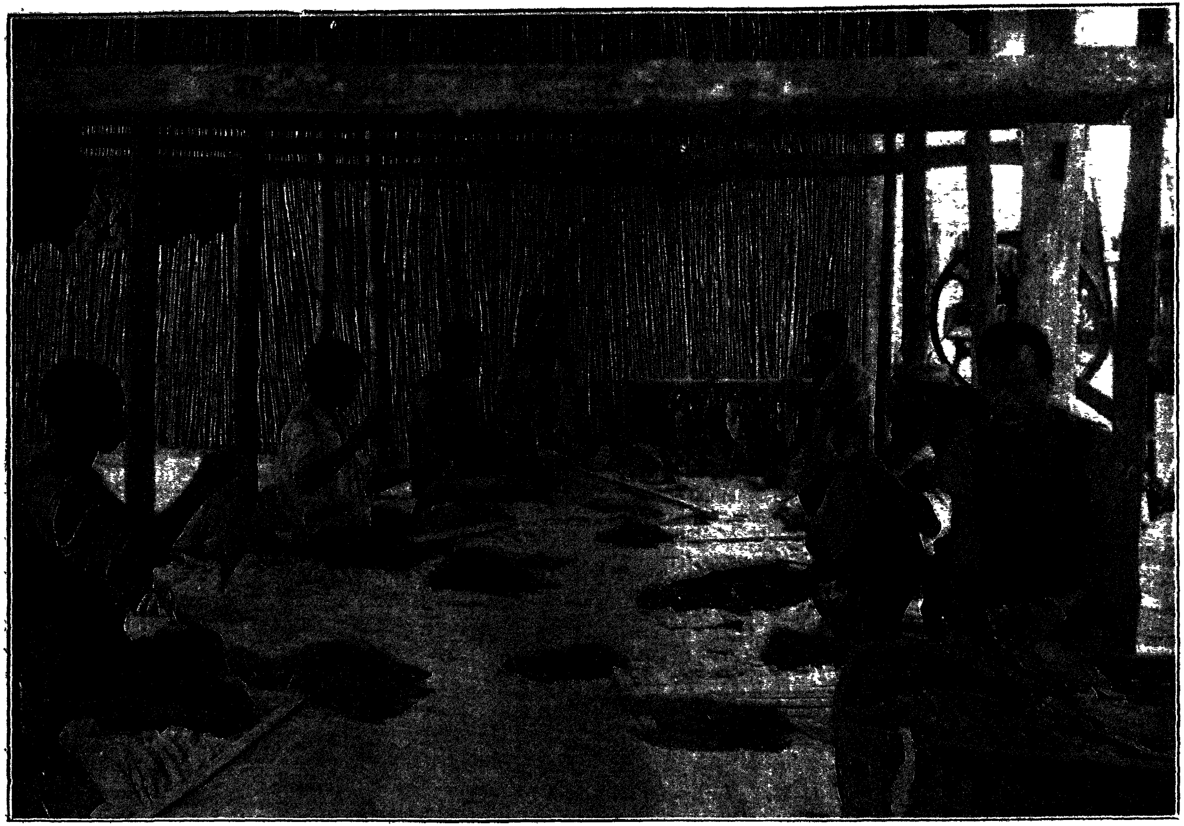


*Plate No. XLII.* STRINGING THE LEAVES ON THE LATHS. [*Photo by Byerley*

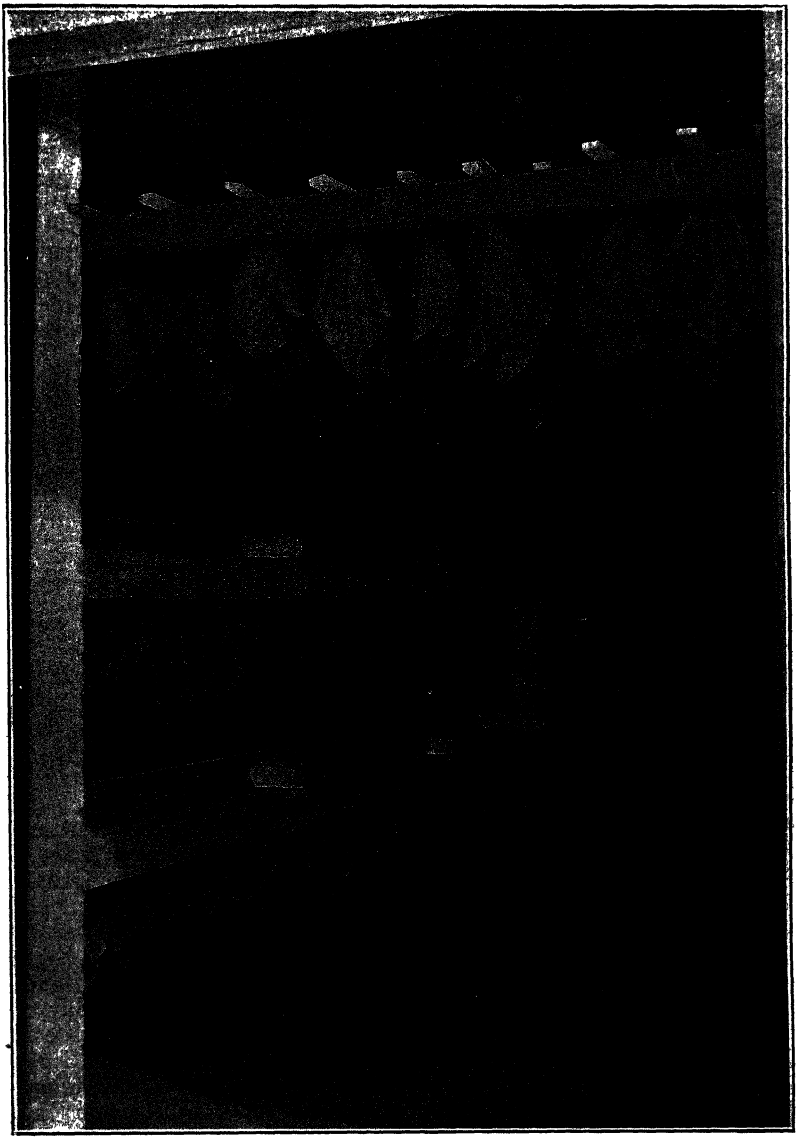


*Plate No XLIII* [*Photo by Byerley.*

SUMATRA TOBACCO HANGING IN THE CURING SHED.

not thoroughly ripe until these flakes are developed, but the best wrappers are obtained by picking them a little under ripe. The very top leaves, being small, are used for filler instead of wrapper, and should be allowed to get thoroughly ripe (see Plate XLI).

After the leaves are picked off of the stalk, they are placed in large baskets and carried to the curing shed where they are strung on laths thirty-five to forty-five leaves being strung on a lath. A good size for sawn laths is 4 feet 6 inches long by 1½ inches wide by ½-inch thisk (see Plate XLII).

At each end of the lath there is a small slit 1 inch deep; a piece of No. 206 hemp string is drawn through this slit, wrapped once round the stick and through the slit again. The string is then cut off about 6 inches longer than the lath and threaded into a large sack or sail needle. The leaves are then taken two at a time and placed faces together and strung on the string. When it is full it is fastened to the other end of the lath as in the first instance. The leaves are evenly distributed along the string, and then the lath is hung in the shed for the tobacco to cure.

## CURING.

In the curing shed the tobacco may be very easily ruined if attention is not paid to it. It may dry too quickly and be a bad colour, or it may absorb too much moisture, and if crowded in the barn get "pole sweat" and be destitute of quality (see Plate XLIII).

To get perfect results no exact rule can be laid down for the manipulation of the shed, as the manipulation varies according to the weather. The shed should not be one that will allow of too high a temperature inside, thatch or brick with thatch roof being most desirable. The ventilation should be thorough and so arranged that all ventilators can be tightly closed if desirable. The following general rule will, however, in most cases apply with good results:—

When green tobacco is first hung in the shed, close the barn tight for three or four days, or until the leaves have yellowed. If the weather is cold and damp during this period, put small charcoal fires in the shed. After the tobacco has yellowed, open the ventilators to drive off all surplus moisture. If the weather is dry, leave the ventilators open over night and close them next day. From time to time, until the tobacco is cured, it should become fairly dry, but it should become moist every twenty-four hours. Sometimes it is necessary to sprinkle the floor of the shed and hang up wet sacks so that the tobacco will not dry too quickly. When all of the leaf, except the midrib, is cured the shed may be opened during the day and closed at night. From the time the tobacco is cured until it is desired to put it in bundles, it should be kept dry and the shed closed tightly all the time. If the shed remains open, the wind breaks the tobacco, and if it is allowed to remain moist "mold" and "white vein" may develop.

When it is desired to tie the tobacco leaves in bunches preparatory to shipping it to the packer, it is necessary to select a time for doing this when the atmosphere is very humid, so the tobacco will come in "case" (absorb moisture) so that it will not break while it is being handled. This condition may be readily attained by opening all doors and ventilators on a damp night, or foggy rainy day. The tobacco should not be wet, but it should contain just enough moisture

to prevent the leaves from breaking. When it is in this condition, take it down out of the shed and pile it in a straight pile, lapping the leaves over each other and letting the laths remain outside of the pile on either side. The pile should not be made on the ground, but on planks or timbers raised about a foot above the ground. After all the tobacco has been put down in this manner, it will hold its moisture a number of days, and during this time it may be prepared and shipped to the packing-house.

The method of procedure is as follows:—Take the laths one at a time and shove the leaves to the middle of the string and cut it at each end of the lath and wind it twice around the butt ends of the leaves and draw the ends of the string between the leaves; this forms what is called a "hand" of tobacco. These "hands" are packed "butts" outward into bales, and the bales are wrapped with paper and hessian, and are then ready to be delivered to the packer or fermenter for the fermentation process. If it is necessary to ship the tobacco a long distance to reach the packing-house, the bales had better be crated. If the fermentation is done by the grower himself or others close to the curing-shed, it is not necessary to bale the tobacco, but it may be taken to the fermenting room after it is made into hands.

The fermentation of cigar tobacco is not a process to be carried out by the farmer, therefore we will not enter into a discussion of this question.

## CONCLUSIONS.

1. Cigar wrapper tobacco can be grown in the Barberton District.
2. Sumatra is the most suitable variety so far tried.
3. That the seed beds must be burned to secure plants free from root gallworm ; that tobacco must not be planted on sour land, new land, nor land badly infested with the worm; that the soil must be sweet, fertile, and well prepared; that cultivation should be thorough and often; that insects eating the leaves must be kept in check; that the leaves must be picked in the early stages of ripeness and cured slowly but regularly and not allowed to "sponge" or "pole sweat."
4. That much more work is needed to determine such points as the relative values of shade-grown and sun-grown tobacco; the kind of fertilizers to apply to get the best results; experiments be conducted with untried cigar wrapper varieties; to try and produce a good filler on some untried soil or with some new variety; and to discover the best way to control certain insect pests, including nematode or root gallworm.

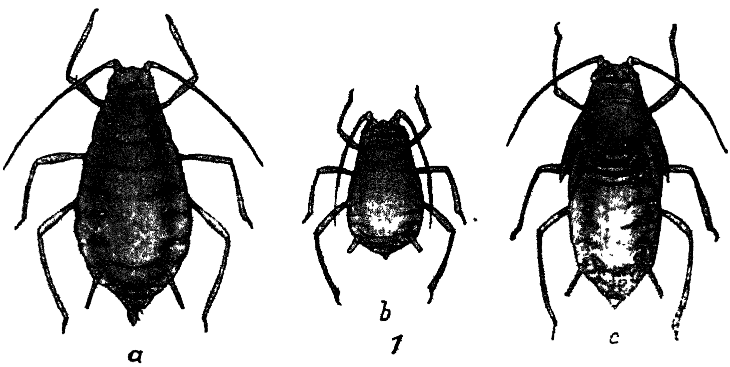
# The Wheat Louse (*Toxoptera graminum*).

By W. Moore, B.A., Lecturer in Entomology and Zoology, School of Agriculture, Potchefstroom.

The wheat aphis, commonly called the wheat louse, is very well known as a destructive pest of wheat to many farmers in South Africa; but other farmers, although the insect is present on their wheat, do not seem to know it or the injury it does. Besides South Africa, this insect is also present both in Europe and America, often causing considerable loss to the wheat farmers.

### History of the Wheat Louse in Foreign Countries.

The wheat louse first became known in Italy in 1852, when it appeared in such large numbers that the flying forms often formed groups like clouds in the air. In Hungary in 1883-4 it was present in large numbers, while it was reported in Belgium in 1906. The




1. The Wheat Louse.
(*a*) Wingless female. (*b*) Young louse. (*c*) Young winged form nearly full-grown. Much enlarged (after Pergande).

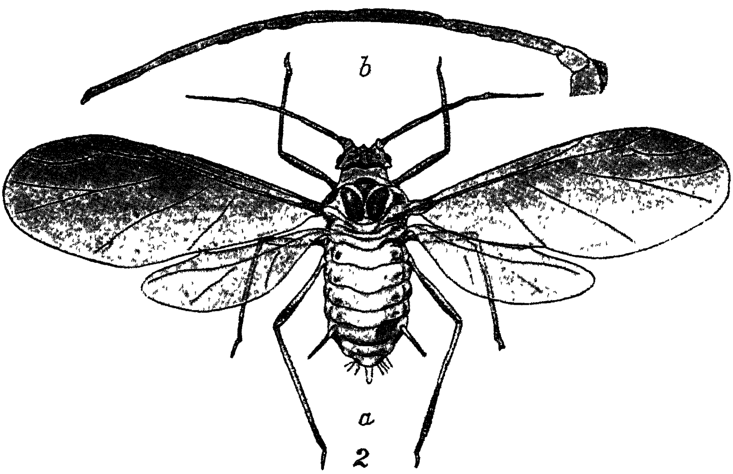
wheat louse made its appearance in the United States in 1882. From that date it has been increasing in importance in America, especially in the grain fields between the Rio Grande and the Missouri Rivers, where during certain years the aphis becomes very abundant, destroying thousands of acres of grain, and often producing total ruin.

### History of the Wheat Louse in South Africa.

The first record in print of the wheat louse in South Africa is contained in the 1903-04 report of the Manager of the Potchefstroom Experimental Farm. In speaking of certain varieties of malting barley, he says: "These grew well for a time, but in October they became badly infested with 'green aphis,' which destroyed the crop." In the Free State the wheat louse was first mentioned in a Farmers' Bulletin published by W. R. Dewar, the Entomologist for the Free State, who also mentions the wheat louse as having caused considerable

damage in the eastern districts in 1904-05 (report of the Department of Agriculture, Orange River Colony). In 1908 a very severe outbreak of the wheat louse occurred in the Free State, and a bulletin was prepared on the wheat louse by C. P. v. d. Merwe. Lounsbury, in the report of the Cape Entomologist for 1908, mentions the louse as occurring in the Cape Colony, in the vicinity of the Zak and Fish Rivers. In 1911 the wheat louse caused considerable loss at the Lichtenburg Dry Land Station. In 1909-10 the wheat louse was noticed for the first time at Njora, British East Africa, and in 1910-11 and 1911-12 severe outbreaks occurred at that place.

Although the wheat louse was not reported in South Africa until 1903-04, it seems to have been present many years before this time. The older farmers in the eastern districts of the Free State, known as the Conquered Territory, state that they can remember the pest as long as they have been farming in those districts. One younger




2. (*a*) The winged migrant female wheat louse much enlarged.
(*b*) Antennae of same (after Pergande).

farmer distinctly remembers the year 1896 as a bad year, inasmuch as it was his first year farming, and he lost his entire grain crop. In these earlier years it does not appear to have been so serious as in later years, probably due to the abundance of locusts, which would suddenly appear and wipe out entirely the field of grain. In so doing they must have eaten many of the lice on the plants and left the others without food. Since the locusts were destroyed the wheat louse has had a better opportunity of showing the injury of which it is capable.

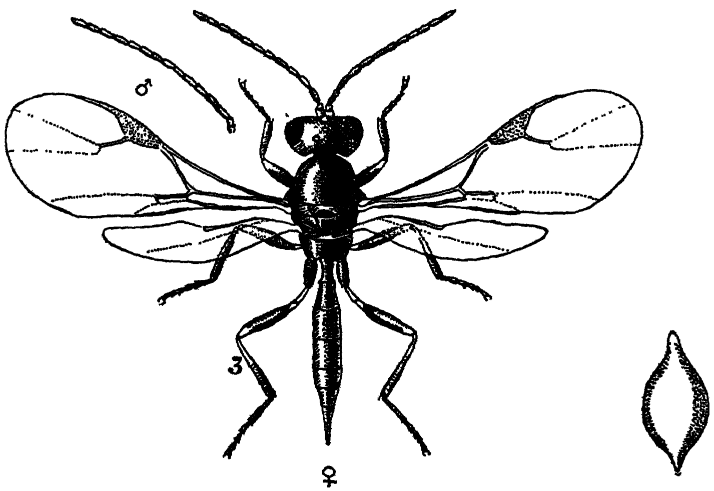
## DISTRIBUTION OF THE WHEAT LOUSE.

The wheat louse seems to be present all over the eastern districts of the Free State, which portion is the main cereal-growing section. It is also probably present over the western portion of the Free State, but only in isolated localities, as this section is not suitable for the production of cereals. In Basutoland, especially in the south about Mohalies Hoek, and in the east near Maseru, the wheat louse is often

found doing considerable injury. In the Cape the localities mentioned, namely, the Zak and Fish Rivers are infested, but farmers in the Wodehouse and Albert districts are acquainted with the pest. The western Transvaal is seriously infested, but the louse is also known in the Ermelo district. From these localities the conclusion might be drawn that the wheat louse is generally distributed over the wheat-growing districts of South Africa, having an altitude of between 3500 and 5000 feet. In some sections, although the louse is present, it never becomes numerous enough to cause serious injury, and thus escapes the farmers' attention.

### INJURY OF THE WHEAT LOUSE.

The wheat louse is one of the sucking insects, and produces its injury by sucking out the juices of the plant. It also probably produces some poisonous effect upon the plant, as it causes a discolora-



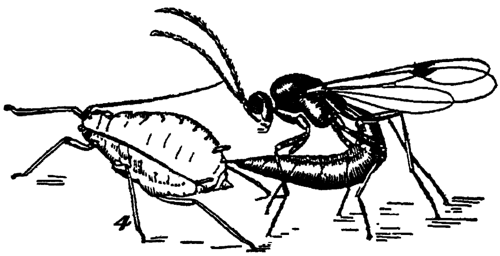

3. *Aphidius testaceipes.*
The parasite which controls the wheat louse in the Union of South Africa. Much enlarged. To the right egg of parasite much enlarged (after Webster).

tion of the tissues, which is not always caused by plant lice, although all of them suck out the juices of the plant. At the point where the louse is attached, the tissues become paler in colour, finally producing yellowish spots on the plant. When severely attacked the whole leaf gradually assumes a yellowish colour and finally dies. The only other injury to wheat caused by insects which might be confused with that of the wheat louse is that produced by the Bagrada bug. This bug produces yellowish spots, but as it sucks out much more of the plant juices the yellow or whitish portion of the leaf is much thinner than the green portion, which is not the case with the wheat louse injury. The leaf attacked by the Bagrada bug generally bends over or breaks off at the injured portion, while the injury of the wheat louse is more evenly distributed, and the whole leaf gradually dies. The Bagrada bug is not primarily a pest to cereals, but is generally found upon plants of the mustard family, such as turnips, radishes, cabbages, etc. When the aphis is present in numbers it produces a sweetish liquid,

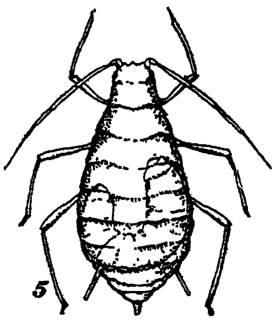
known as "Honeydew," which becomes viscid or sticky, and often covers entirely the leaves of the infested plant. Many flies and ants of various species will be found collected around such a locality to feed upon the honeydew.

### DESCRIPTION OF THE WHEAT LOUSE.

In South Africa there seems to be but two forms of the wheat louse, namely, the winged migratory females and the wingless or apterous


4. Internal parasite depositing an egg in the body of a wheat louse. Much enlarged (after Webster).

females. The males and egg-laying or oviparous females have not been seen. The apterous female is about one-sixteenth of an inch in length. The colour is light green or yellowish green, and on the whole of a lighter colour than the leaf upon which it feeds. When examined under a lens it will be found to have a darker green line down the middle of the abdomen. This line is visible to the naked eye if the insect is carefully examined. The eyes are black, antennae black, the


5. Larva of the parasite in the body of a wheat louse. Much enlarged (after Webster).

basal segments yellowish, legs yellowish, the tarsi or "foot" black. The nectaries or honey tubes, situated one on each side of the abdomen near the posterior end, are green in colour, the apex being black.

The migratory female is nearly one-eighth of an inch in length, and has a wing expanse of about one-quarter of an inch. The body in colour is much similar to the apterous female, but the head is brownish yellow, while the thorax between the wings has three dark or black areas. The young or immature females are similar in colouring to the apterous females

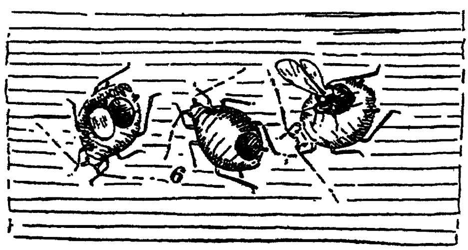
### THE DARK GREEN APHIS.

The writer has found but one other aphis feeding upon cereals in South Africa, with which the wheat louse might be confused. This is the dark green aphis.

The dark green aphis may be distinguished from the wheat louse by its dark green or bluish green colour—the wheat louse being bright green or yellowish in colour. The head and legs are black, the antennae light yellow at the base, dark or black at the outer half. The nectaries are black, and there is usually a dark spot on the abdomen at the base of the nectaries. The dark green aphis does not produce a discolouration of the tissues of the base such as are produced by the wheat louse, but it produces an abundant supply of "honey-dew"—probably more than is produced by the wheat louse. This aphis does not become abundant until about January, but it is often found upon grain which is being grown for green forage between March and June.

### LIFE CYCLE OF THE WHEAT LOUSE.

As previously stated, all the individuals of the wheat louse are females. They reach maturity in about seven days from birth, and




6. Parasitized lice on a leaf. The right-hand figure shows a parasite emerging. Much enlarged (after Webster).

then in their turn produce living young without ever having been fertilized, as there are no males. During the summer time the louse lives for about thirty-two days, producing on the average about three young per day for a period of twenty-five days. As long as conditions are favourable, all the young produced become apterous females. Such are the conditions in the grain fields about August, September, and October. About the end of October or the beginning of November the grain is approaching maturity and is becoming too tough for the wheat louse. If the field is then examined it will be found that the young forms have little wing pads on each side of the body or thorax. These forms are developed into the winged or migratory females. They then leave the grain field and seek out certain grasses upon which they can spend the summer months when no grain is available. If sufficient rain has fallen to bring up the grasses, the change is made without much loss to the aphis. If, however, the rain has not fallen, and the grass is not yet up, this change of food plants must result in the loss of large numbers of the aphis, as they cannot find the proper food plants and die. In such a season as that of 1912-13, when the rains were very late, most of the aphis die

out. During December, 1912, and January, 1913, at Potchefstroom, the only individuals which could be found were a few upon grasses growing along the water-furrows. If such were the results of the season on an irrigated farm, what must have been the result on a dry farm?

### RELATION OF THE WHEAT LOUSE AND ANTS.

Nature has, however, provided for just such a season, the wheat louse having a friend in the form of the common greyish-brown ant

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7. Leaves of a wheat plant covered with dead lice killed by the internal parasite. Natural size (after Webster).

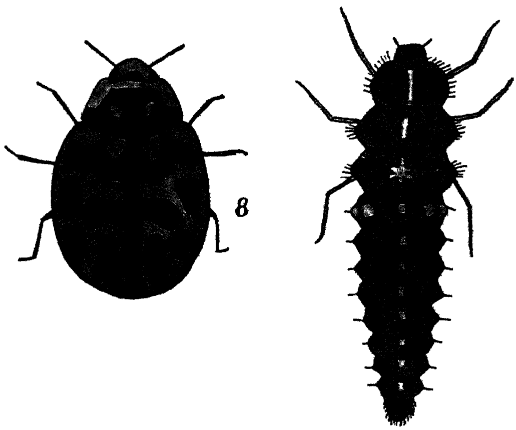
of the veld (*Plagiolepis dustodiens* Sm.)—this ant, and in fact other species of ants, derive considerable food from the wheat louse in the form of "honeydew." This "honeydew" is produced from the nectaries of the louse, and the ant has found that by stroking the abdomen of the louse with its antennae, the louse will produce more of the "honeydew." The louse, therefore, bears the same relation to the ant as the cow does to man. When the louse in November or December attempts to change its food plants, the ant frequently

finds certain individuals which cannot find a suitable grass. These are picked up by the ant and carried underground, where they are placed on the underground stems or shoots, and in some cases the roots of the grasses upon which they can live. Here they are tended by the ants, while the ants are repaid for their treatment by "honeydew."

### The Wheat Louse during the Summer.

These forms of the wheat louse become pale in colour, often quite white, losing their green colour in the absence of light. When the rains come and the grasses grow out the aphis are again found upon the leaves of the plant. Many, however, will be found underground all through the summer.

Migratory forms which leave the grain fields do not reproduce as rapidly as do the apterous females, only producing an average of two young a day for about twenty days, but, being winged, they will




8. The Black Spotted Ladybird and its larva. Much enlarged.

spread the louse over a larger area than is possible for the apterous females. The young of the migratory females grow into apterous females. All through the summer the wheat louse reproduces as it did on the grain during August, September, and October.

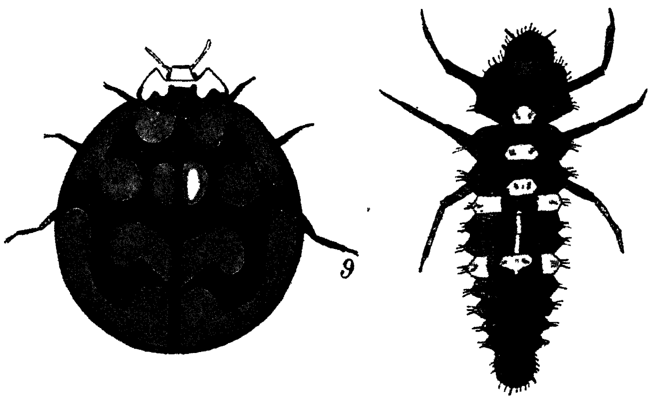
### The Return of the Wheat Louse.

In March most farmers put in a small area of rye or barley for green forage. Many of the grasses upon which the wheat louse has spent the summer have by that time become old and tough, and winged forms are being produced. These return to the grain fields in March. At Tweespruit in March, 1913, a count was made in various parts of a field of rye, and it was found that there was an average number of two winged aphis to each square foot. If the summer grasses remain tender, or if no grain is available, then the louse waits to return to the grain field until the frost has killed the grass.

### The Wheat Louse during the Winter.

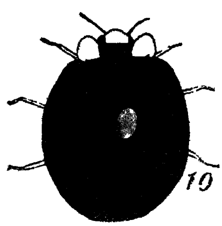
During the winter the wheat louse is found upon various cereals. It migrates from the green forage into the larger fields of grain during

July, generally about the middle of the month. In countries where the mean daily temperature is below 35° F., and the minimum about 3° or 4° F., that is about 28° or 29° of frost, the ordinary forms of the wheat louse are destroyed by cold. If the winter is wet they seem to be unable to stand a minimum temperature of much below 18° F., that is 14° of frost. Under these conditions true males and females are produced when the cold weather sets in, and the true female after being fertilized produces eggs which are able to withstand the cold, thus carrying the louse through the winter.




9. The Red Spotted Ladybird and its larva. Much enlarged.

As far as has been observed, the wheat louse in South Africa seems to be able to successfully pass the winter without laying eggs or producing true males and females. An exception to this may be where the wheat louse is at an altitude of more than 5000 feet. Where this occurs, if it does, it is not likely that the wheat louse ever produces severe injury. The reason for this will be given later in the paper.



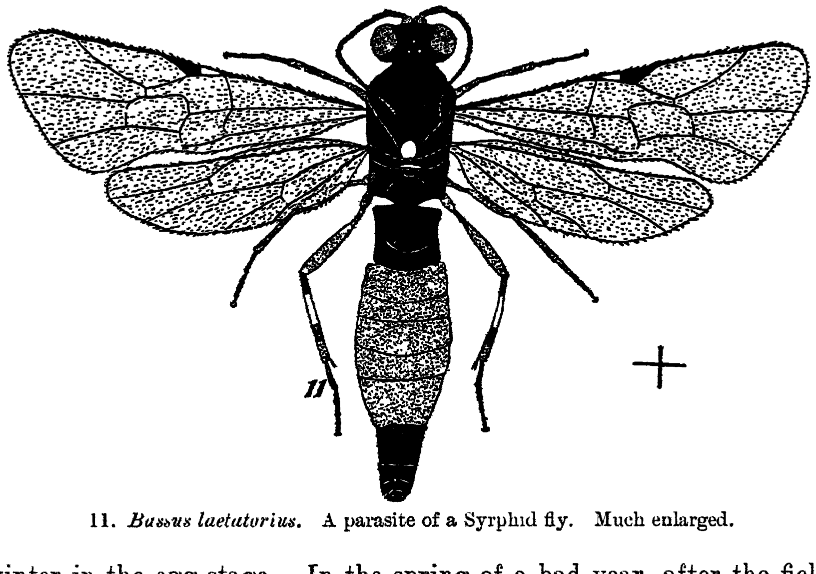

10. The Black Ladybird. Much enlarged.

The wheat louse breeds throughout the winter in those localities where it produces the most severe losses. Below a mean daily temperature of 40° to 50° F. the louse lives longer, and although it produces a small number of young per day, it produces more in its lifetime than it does in a mean temperature of 60° to 70° F. These young lice, however, do not reach maturity very rapidly, requiring, at a mean temperature of about 35° F., about two to three months, as compared with about seven days in the summer time. The result

is that a large number of lice are found on the plants, which are mostly young ones. With the approach of spring and warm weather, these mature rapidly, and soon a severe attack on the wheat is produced. This usually takes place between August and October, but varies according to the season.

### MIGRATION OF THE WHEAT LOUSE.

If the field is under rather dry conditions, or if the lice are present in excessive numbers, the plants are killed. When such plants begin to die the aphis produces winged forms, and these migrate to other fields where the plants are still green and vigorous. In some countries these migrations extend over great distances. They occur both in Europe and in the United States. In the United States they are often responsible for bad outbreaks in localities where normally such would not occur. In the State of Texas the wheat louse breeds throughout the winter, while in the Northern States they spend the



11. *Bassus laetatorius.* A parasite of a Syrphid fly. Much enlarged.

winter in the egg stage. In the spring of a bad year, after the fields of wheat in Texas are destroyed, the wheat louse migrates north, adding their numbers to those present in the north which have hatched from the eggs. The result is the production of such large numbers that the plants are unable to survive the attack. In South Africa similar migrations also occur. Generally about September or October, when the fields of wheat in the drier sections have been destroyed, the winged forms of the louse migrate in swarms like small clouds to the portions where the wheat has not yet been killed. Farmers about Ficksburg, Orange Free State, state that these swarms come from the west, occurring about late in September or October. It is probably due to these swarms that the louse does so much damage in the eastern districts of the Orange Free State. In the western portions the rainfall is less and the grain would die sooner. The lice then migrating east, and adding their numbers to those already present in

the east, soon kill off the grain. Probably due to the better rainfall in the east the louse would never be able to kill off the grain were it not for the increased numbers coming in from the west. In Basutoland most of the injury must be done by migrations from the Orange Free State. The natives, as a rule, do not plant grain to be used as green forage, so that there is a period—from the time the grass is killed by frost until late July, when the wheat is up—when the louse has nothing to live on in Basutoland with the exception of a few isolated plots of green forage about the towns, such as Maseru. Although migrations occur they do not seem to be on so large a scale as the migrations reported in the United States of America.

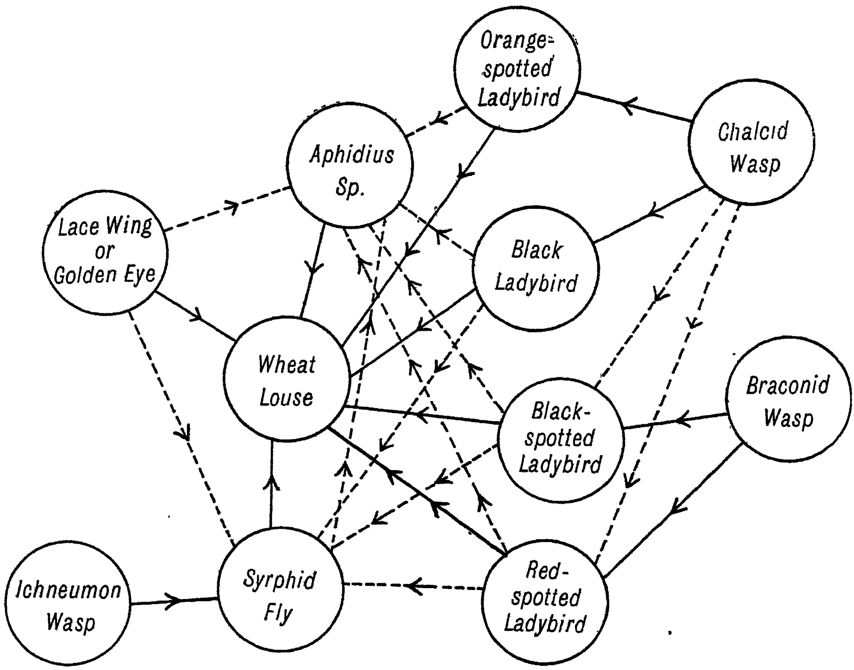



Diagram showing the relation of the different insects to each other. Heavy lines show direct destruction of the insect concerned. Dotted lines show indirect or accidental destruction of the insect concerned.

## FOOD PLANTS OF THE WHEAT LOUSE.

The wheat louse may be found upon either wheat, oats, rye, or barley, almost at any time during the year that such plants are found in the fields. They may be present in such small numbers that the farmer never notices them, but if a careful search is made they will generally be found. During the late winter they may be found on the main cereal crop, while many spend the summer upon stray plants which have sprung up in the field or along the border, generally known as "volunteer plants.". Rescue grass (*Bromus willdenowii*), which is found green during the winter, is a grass upon which the wheat louse may be found during the winter months if no wheat, etc., is available. During the summer, if no grain is found in the field,

the wheat louse feeds upon different grasses. A very favourable grass, one upon which the wheat louse is generally found at Potchefstroom, is Johnston's grass (*Sorghum halepense*). It is also found at Potchefstroom on goose grass (*Eleusine indica*), sweet grass (*Panicum laevifolium*), maize, and Kaffir corn. In the Free State and Basutoland the louse was found on maize, Kaffir corn, the "blue grass" of the Conquered Territory—which is the same as the sweet grass (*Panicum laevifolium*)—teff grass, and millet. Johnston's grass seems to be the favourite food plant of the wheat louse at Potchefstroom, where it becomes so abundant at times as to actually kill portions of the grass. The wheat louse and the dark green aphis are often to be found upon the roots and underground shoots of this grass. In the Free State and Basutoland the favourite plants seem to be the "blue grass," mealies, and Kaffir corn. The large fields of "blue grass" found in the Conquered Territory makes it easy for the wheat louse to pass the summer, and is probably partly responsible for the severe outbreak in that portion of the Free State. The "blue grass" ripens about the time the farmers' crops of rye, barley, and oats for green forage are just coming through the ground, i.e. about the middle of March, when the louse leaves its summer grasses and migrates to the grain fields. At Potchefstroom, where the "blue grass" or sweet grass is not so abundant, it is found feeding upon the Johnston's grass, even after the green forage crops are up and well advanced. The change there is made generally when the grasses are frosted, about June, or even July in some cases. C. P. van der Merwe* mentions the kweek grass (*Cynodon dactylon*) as a host plant of the wheat louse. There are probably many more grasses upon which it could live, as it has been reported upon many other species of grasses in America. It is interesting to note that the wheat louse has not been found upon *Paspalum dilatatum*, even where the paspalum was growing side by side with infested Johnston's grass.

* Bulletin XVII, Department of Agriculture, Orange River Colony.

(*To be continued.*)

# Results of Manurial Experiments on Maize.

By H. J. Vipond, Chemist, Department of Agriculture.

During the last three years a manurial experiment on maize has been carried on at Koedoespoort by Mr. Chas. Weir. The results for the first two years have been published in the *Agricultural Journal* (see Vol. II, No. 5, and Vol. IV, No. 4). The last season has been a trifle more favourable in the matter of rainfall, but this was much more than counterbalanced by the prevalence of witch-weed on all the plots although particularly on those which had carried beans in the two previous years. No beans were sown with the crop this year and the maize was all checkrowed 2 feet 6 inches by 3 feet. This, with an average of two to three plants per hill, gave too heavy a stand considering the moderate rainfall. Owing to the presence of witch-weed and the prevalence of grub the greater part of the crop was not allowed to ripen and, for the purpose of arriving at results, representative patches were selected and the total weight of the crop, grain, and stover combined was found; determinations of moisture being made in order to arrive at the amount of dry matter produced per acre.

No further applications of manure had been given, the object being to determine the residual value of the manures applied during the first and second years. The results are given in the following table, together with a summary of the previous results.

No very close comparisons may be drawn from this year's results as the witch-weed, although present practically everywhere, was worse on some plots than others; it was particularly bad on plots Nos. 2 and 4, especially the latter.

In spite of this, very considerable increases are shown on all the plots receiving phosphates. The average yield on the four plots receiving no phosphates is 1645 lb. of dry matter, and from the twelve plots receiving phosphates (and in some cases nitrogen) is 3795; the ratio between these two figures is 1 : 2.3. The plots which previously received nitrogen in some form or other show very little general superiority over the others, although it is by no means a fair comparison. The residual value of the phosphatic manures applied during the first two years is still very high. In the earlier stages of growth, before witch-weed or drought had begun to affect the plots, one came to the conclusion that basic slag showed a distinct falling off in this the third year of its action, and that the raw Weenen phosphate (1000 lb. per acre) was better than ever. We regret that we have been prevented from drawing conclusions as to the effect of the leguminous crop and of nitrogenous manures generally on the growth of maize.

## RESULTS OF MANURIAL EXPERIMENTS ON MAIZE AT KOEDOESPOORT, 1910–13 (THREE YEARS).

| Plot. | Manurial Treatment per Acre. 1910–11. | Manurial Treatment per Acre. 1911–12. | Yield of Maize per Acre. 1910–11. | Yield of Maize per Acre. 1911–12. | Increase due to Manure. 1910–11. | Increase due to Manure. 1911–12. | Increase due to Manure. 2 years. | Value of Increase at 9s. per 200 lb. 2 years. | Cost of Manure. 2 years. | Profit or Loss from Manuring. 2 years. | Yield per Acre (both grain and stover), 1912-13. In natural state. | Yield per Acre (both grain and stover), 1912-13. Dry matter. | Plot. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | lb. | lb. | lb. | lb. | lb. | £ s. d. | £ s. d. | £ s. d. | lb. | lb. | |
| 1 | 600 lb. Slaked Lime ... | Nil ... ... ... ... | 625 | 1,062 | 186 | 460 | 646 | 1 9 1 | 1 1 0 | *0 8 0 | 6,316 | 1,785 | 1 |
| 2 | 600 lb. Slaked Lime and 200 lb. Superphosphate | 200 lb. Superphosphate ... | 898 | 1,993 | 459 | 1,391 | 1,850 | 4 3 3 | 2 2 0 | *2 1 0 | 9,870 | 4,621 | 2 |
| 3 | 1000 lb. Ground Weenen Phosphates | Nil ... ... ... ... | 837 | 1,872 | 398 | 1,270 | 1,668 | 3 15 1 | 1 12 6 | *2 2 7 | 10,790 | 5,214 | 3 |
| 4 | 200 lb. Superphosphate ... | 200 lb. Superphosphate ... | 813 | 1,822 | 374 | 1,220 | 1,594 | 3 11 10 | 1 1 0 | *2 10 10 | 6,522 | 2,810 | 4 |
| 5 | 400 lb. Basic Slag ... ... | Nil ... ... ... ... | 1,106 | 2,220 | 667 | 1,620 | 2,287 | 5 2 11 | 1 0 0 | *4 2 11 | 9,210 | 3,076 | 5 |
| 6 | Nil ... ... ... ... | Nil ... ... ... ... | 439 | 602 | — | — | — | — | — | — | 5,789 | 1,645 | 6 |
| | (Plots 1 to 6 during the first two seasons carried a mixed crop of maize and velvet beans, sown together in the rows, which were 3 ft. 6 in. apart.) | | | | | | | | | | | | |
| 7 | 1000 lb. Ground Weenen Phosphates ... ... | Nil ... ... ... ... | 1,224 | 2,217 | 562 | 1,733 | 2,295 | 5 3 5 | 1 12 6 | *3 10 11 | 11,052 | 3,667 | 7 |
| 8 | Nil ... ... ... ... | Nil ... ... ... ... | 662 | 484 | — | — | — | — | — | — | 4,868 | 1,565 | 8 |
| 9 | 600 lb. Slaked lime ... | Nil ... ... ... ... | 896 | — | 234 | — | — | — | — | — | 5,526 | 1,589 | 9 |
| 10 | 600 lb. Slaked Lime and 200 lb. Superphosphate | 200 lb. Superphosphate ... | 1,214 | — | 552 | — | — | — | — | — | 10,526 | 3,580 | 10 |
| 11 | 400 lb. Basic Slag ... | Nil ... ... ... ... | 1,497 | 2,433 | 835 | 1,949 | 2,784 | 6 5 4 | 1 0 0 | *5 5 4 | 9,474 | 3,663 | 11 |
| 12 | 200 lb. Superphosphate ... | 200 lb. Superphosphate ... | 1,199 | — | 537 | — | — | — | — | — | 8,932 | 3,544 | 12 |
| 13 | 400 lb. Bone Meal ... ... | Nil ... ... ... ... | 1,612 | 1,734 | 950 | 1,250 | 2,200 | 4 19 0 | 1 8 0 | *4 11 0 | 8,947 | 2,697 | 13 |
| 14 | 200 lb. Superphosphate and 150 lb. Nitrate of Soda | 200 lb. Superphosphate and 100 lb. Nitrate of Soda | 1,459 | — | 797 | — | — | — | — | — | 10,520 | 4,693 | 14 |
| 15 | 200 lb. Bone Meal and 100 lb. Superphosphate | 100 lb. Superphosphate ... | 1,305 | 2,016 | 643 | 1,532 | 2,175 | 4 17 11 | 1 4 6 | *4 13 5 | 11,579 | 4,321 | 15 |
| 16 | 200 lb. Superphosphate, 150 lb. Nitrate of Soda, and 100 lb. Sulphate of Potash | 200 lb. Superphosphate, 100 lb. Nitrate of Soda, and 50 lb. Sulphate of Potash | 1,336 | — | 674 | — | — | — | — | — | 8,940 | 3,650 | 16 |
| | (Plots 7 to 16 carried maize only right through, rows 3 ft. apart, the first two seasons. Plots 9, 10, 12, 14, and 16 were completely spoilt by pigs in 1912.) | | | | | | | | | | | | |

* Profit.

# The Chemical Composition of South African Maize and other Cereals.

By Dr. C. F. Juritz, Chief Chemist, Cape Province.

(*Continued from page* 197.)

## Maize.

We have now to consider the analyses of maize. Most of the samples, whose analyses are tabulated below, were procured by Mr. J. Burtt-Davy, Government Botanist, at my request, towards the close of 1911 and early in 1912, and distributed for analysis between the laboratories at Capetown, Grahamstown, and Pretoria. The results obtained were as follows:—

| Serial Number. | Variety. | Water. | Proteins, N × 6·25. | Fat. | Digestible Carbo-hydrates. | Fibre. | Ash. | Phosphoric Oxide. | Fuel Value: Calories per pound. | Nutrient ratio. |
|---|---|---|---|---|---|---|---|---|---|---|
| *Cape Province:* | | | | | | | | | | |
| 1 | — ... ... | 11·28 | 9·81 | 3·68 | 71·62 | 1·88 | 1·73 | — | 1630 | 8·1 |
| 2 | Iowa Silver Mine... ... | 12·81 | 9·47 | 5·79 | 69·18 | 1·65 | 1·10 | ·537 | 1665 | 8·7 |
| 3 | „ „ (meal)... | 11·61 | 9·74 | 5·67 | 70·50 | 1·37 | 1·11 | ·820 | 1689 | 8·5 |
| 4 | Hickory King ... ... | 12·04 | 8·15 | 6·02 | 71·42 | 1·27 | 1·10 | ·572 | 1691 | 10·4 |
| 5 | „ „ (meal) ... | 10·94 | 8·10 | 6·60 | 72·03 | 1·20 | 1·13 | ·850 | 1726 | 10·7 |
| 6 | — ... ... | 11·35 | 10·64 | 5·02 | 70·02 | 1·67 | 1·30 | ·492 | 1671 | 7·6 |
| 7 | — (meal) ... | 10·72 | 10·64 | 6·29 | 69.11 | 1·57 | 1·67 | ·618 | 1706 | 7·8 |
| 8 | — (meal) ... | 8·70 | 8·71 | — | — | — | 1·07 | ·49 | — | — |
| 9 | German Yellow ... ... | 11·63 | 9·87 | 4·49 | 71·10 | 1·39 | 1·52 | .701 | 1655 | 8·2 |
| 10 | Hickory King ... ... | 11·45 | 9·36 | 4·20 | 72·40 | 1·26 | 1·33 | ·539 | 1658 | 8·7 |
| 11 | „ „ ... ... | 13·50 | 8·39 | 4·43 | 70·93 | 1·49 | 1·26 | ·505 | 1639 | 9·6 |
| 12 | „ „ ... ... | 11·89 | 9·30 | 4·73 | 71·21 | 1·44 | 1·43 | ·629 | 1657 | 8·8 |
| 13 | „ „ ... ... | 12·20 | 9·36 | 4·36 | 71·45 | 1·43 | 1·20 | ·536 | 1647 | 8·7 |
| 14 | — ... ... | 11·91 | 9·30 | 4·53 | 71·65 | 1·48 | 1·13 | ·471 | 1656 | 8·8 |
| 15 | White Cango ... ... | 7·67 | 11·64 | — | — | — | 1·22 | ·23 | — | — |
| 16 | Yellow Cango ... ... | 7·55 | 10·76 | — | — | — | 1·04 | ·21 | — | — |
| 17 | German Yellow ... ... | 7·56 | 10·93 | — | — | — | 1·37 | ·23 | — | — |
| 18 | Eureka ... ... ... | 7·19 | 10·15 | — | — | — | 1·09 | ·25 | — | — |
| *Orange Free State:* | | | | | | | | | | |
| 19 | Hickory King ... ... | 9·83 | 8·79 | 4·46 | 74·15 | 1·59 | 1·18 | ·466 | 1690 | 9·6 |
| 20 | Yellow Cango ... ... | 9·48 | 10·27 | 4·84 | 72·41 | 1·51 | 1·49 | .578 | 1700 | 8·1 |
| 21 | Hickory King ... ... | 9·90 | 9·53 | 4·43 | 73·65 | 1·15 | 1·34 | ·528 | 1709 | 8·8 |
| 22 | Cango ... ... ... | 9·65 | 11·29 | 4·88 | 71·09 | 1·66 | 1·43 | ·562 | 1696 | 7·3 |
| 23 | Hickory King ... ... | 9·54 | 9·87 | 4·58 | 73·46 | 1·19 | 1·36 | ·466 | 1701 | 8·5 |
| 24 | Yellow Cango ... ... | 8·83 | 10·27 | 5·03 | 73·24 | 1·48 | 1·15 | ·425 | 1723 | 8·2 |
| 25 | Round Yellow ... ... | 9·85 | 10·89 | 4·99 | 71·52 | 1·60 | 1·15 | ·427 | 1701 | 7·6 |
| 26 | Yellow Cango (?)... ... | 10·26 | 10·44 | 4·49 | 71·67 | 1·81 | 1·33 | ·564 | 1676 | 7·8 |
| 27 | Hickory King ... ... | 9·96 | 9·64 | 4·20 | 73·63 | 1·45 | 1·12 | ·418 | 1685 | 8·6 |
| 28 | „ „ ... ... | 10·38 | 9·19 | 5·00 | 72·48 | 1·69 | 1·26 | ·491 | 1688 | 9·1 |
| 29 | German Yellow ... ... | 9·92 | 10·21 | 4·59 | 72·34 | 1·68 | 1·26 | ·457 | 1688 | 8·1 |
| 30 | Yellow Cango ... ... | 10·92 | 11·23 | 5·28 | 70·65 | 1·54 | 1·28 | ·558 | 1704 | 7·4 |

| Serial Number. | Variety. | Water. | Proteins, N × 6·25. | Fat. | Digestible Carbo-hydrates. | Fibre. | Ash. | Phosphoric Oxide. | Fuel Value: Calories per pound | Nutrient ratio. |
|---|---|---|---|---|---|---|---|---|---|---|
| *Transvaal:* | | | | | | | | | | |
| 31 | Iowa Silver Mine (meal)... | 12·38 | 8·69 | 4·60 | 71·98 | 1·13 | 1·22 | ·644 | 1654 | 9·5 |
| 32 | Gillespie's Yellow (meal)... | 11·08 | 9·25 | 6·64 | 70·62 | ·97 | 1·44 | ·800 | 1722 | 9·2 |
| 33 | Hickory King ... ... | 8·25 | 10·15 | — | — | — | 1·09 | ·51 | — | — |
| 34 | Eureka ... ... ... | 8·28 | 9·19 | — | — | — | 1·08 | ·47 | — | — |
| 35 | Chester County Mammoth | 8·12 | 9·58 | — | — | — | ·94 | ·39 | — | — |
| 36 | White Botman ... ... | 7·94 | 12·69 | — | — | — | 1·10 | ·44 | — | — |
| 37 | Sheep's Tooth ... ... | 8·41 | 10·06 | — | — | — | 1·29 | ·62 | — | – |
| 38 | Iowa Silver Mine ... ... | 8·24 | 9·63 | — | — | — | 1·17 | ·50 | — | — |
| 39 | Yellow Hogan ... ... | 8·19 | 9·71 | — | — | — | 1·24 | ·62 | — | — |
| 40 | Chester County Mammoth | 8·08 | 8·58 | — | — | — | ·94 | ·42 | — | — |
| 41 | Wills' Gehu ... ... | 8·06 | 11·55 | — | — | — | 1·14 | ·52 | — | — |
| 42 | Wills' Dakota ... ... | 7·61 | 11·29 | — | — | — | 1·04 | ·45 | — | — |
| 43 | Argentine ... ... ... | 7·98 | 8·23 | — | — | — | 1·42 | ·69 | — | — |
| 44 | Virginia Horsetooth ... | 7·96 | 10·84 | — | — | — | 1·51 | ·67 | — | — |
| *Natal:* | | | | | | | | | | |
| 45 | Hickory King ... ... | 8·57 | 9·71 | — | — | — | 1·26 | ·60 | — | — |
| 46 | White Horsetooth... ... | 9·08 | 9·36 | — | — | — | 1·20 | ·58 | — | – |
| 47 | Golden Beauty ... ... | 9·04 | 9·98 | — | — | — | 1·22 | ·63 | — | — |
| 48 | Yellow Horsetooth ... | 8·70 | 10·06 | — | — | — | 1·23 | ·57 | — | — |
| 49 | Hickory King ... ... | 8·15 | 9·98 | — | — | — | 1·29 | ·62 | — | — |
| 50 | German Yellow ... ... | 8·63 | 9·36 | — | — | — | 1·23 | ·62 | — | — |
| 51 | Boone County ... ... | 8·01 | 9·84 | — | — | — | 1·12 | ·48 | — | — |

Of the above it will be observed that Nos. 1 to 18 were grown in the Cape Province, Nos. 19 to 30 in the Orange Free State, Nos. 31 to 44 in the Transvaal, and Nos. 45 to 51 in Natal.

No. 1 was procured in the Cape Division through the Government Commercial Agent.

Nos. 2 to 8 were procured from Mr. W. H. Horsfall, Aliwal North. Of these Nos. 2 and 3 were Iowa Silver Mine, and Nos. 4 and 5, Hickory King. Nos. 2 and 4 were received in the laboratory in an unground condition, while Nos. 3 and 5 were ground maize (mealie meal).* No. 6 was a sample of whole grain and No. 7 of the meal ground therefrom. No. 8 was also a sample of mealie meal.

Nos. 9 and 10 were grown by Mr. G. Stanford, of Welcome Wood, Kingwilliamstown, on sandy soil (dry land cultivation) without manure. No. 9 was a sample of German Yellow Maize, and No. 10 of Hickory King.

No. 11, a Hickory King, was grown by Mr. W. E. Gray, Post Wellington, Kingwilliamstown Division, on a manured heavy clay soil.

No. 12 was a Hickory King grown by Mr. H. Sheard, Underchurch, Cathcart Division, on red sandy loam (dry land cultivation) without manure.

No. 13, another sample of Hickory King, was grown by Mr. O. Hopelt, Grasslands, Bolo, Stutterheim Division, on good rich sandy loam (dry land) without manure.

* The Iowa Silver Mine, it will be noticed, gave distinctly better protein percentages than the Hickory King, but had less fat and consequently were somewhat lower in fuel value.

No. 14 was grown by Mr. J. W. Hardwick, Winetbury, Komgha Division, on sandy loam (dry land) without manure.

Nos. 15 to 18 were respectively a White and a Yellow Cango, a German Yellow Maize, and Eureka, grown by Mr. Cullinan on the farm England in the Vryburg District. On account of the northerly situation of this locality these four samples will, in the subsequent discussion, be grouped not with the Cape Province but with the Transvaal samples.

Of the twelve Orange Free State samples—

No. 19 was a Hickory King, grown on the farm Stirling, ten miles from Bethlehem.

No. 20 was a Yellow Cango from the farm Brakpan, eight miles from Bethlehem.

Nos. 21 and 22 were grown on the farm New Holland, near Heilbron, No. 21 being a Hickory King and No. 22 a Cango.

No. 23 was a sample of Hickory King, grown by Mr. C. Stevens, Schultes Draai, Ficksburg District, on soil which had been fertilized with superphosphate.

Nos. 24 and 25 were respectively a Yellow Cango and a Round Yellow Maize from the Ficksburg District. No. 26 was also grown in the Ficksburg District from Yellow Cango or Round Yellow Maize.

Nos. 27 and 28 were samples of Hickory King, the former grown in the Ladybrand, the latter in the Kroonstad, District.

No. 29 was a German Yellow Maize from the Bloemfontein District, and No. 30, from the same district, was a Yellow Cango, seed quality.

In the Transvaal, Nos. 31 and 32 were samples of mealie meal from Mr. W. Gillespie, Rietpoort, Zandspruit, No. 31 being a sample of Iowa Silver Mine Maize, while No. 32 was described as 8-row flint Gillespie's Yellow or red-cored maize.

Nos. 33 and 34 were respectively Hickory King and Eureka from Mr. M. Geerdts, Schapenrust.

Nos. 35 and 36 were grown at Leeuwdoorns, Wolmaransstad, the former being a Chester County Mammoth grown by Mr. S. J. Hyde, the latter a White Botman (seed quality) grown by Mr. Fleming.

No. 37 was a Sheep's Tooth Maize, obtained from Messrs. Bright and Pallister, Buffelspoort.

No. 38 was a sample of Iowa Silver Mine, grown at the Government Experimental Farm, Potchefstroom.

No. 39, grown by Mr. W. A. McLaren at Vereeniging, in the Heidelberg District, was a Yellow Hogan.

No. 40 was grown by Mr. C. F. Stallard at Nancefield, Johannesburg. Like No. 35, it was a Chester County Mammoth, and resembled that sample in its low percentages of ash and phosphoric oxide.

Nos. 41 to 44 were grown in the Pretoria District, Nos. 41 and 42 by Mr. Pullen at Schurveberg from seed furnished by Messrs. Oscar Wills & Co., United States. No. 41 was a sample of Wills' Gehu, No. 42 of Wills' Dakota. No. 43 was an Argentine Maize grown at Skinners Court, and No. 44 a Virginia Horsetooth grown by Mr. P. C. Bezuidenhout, Kameeldrift.

Of the remaining seven samples in the above table, all of which came from Natal, Nos. 45 to 48 were grown by Mr. W. P. Bosse at Richmond. No. 45 was a sample of Hickory King, No. 46 a Natal White Horsetooth, No. 47 a Golden Beauty, and No. 48 a Yellow Horsetooth.

No. 49 was a Hickory King, grown by Mr. J. Moon, of Manderston, No. 50 a German Yellow Maize, grown at Craigside by Mr. J. W. Flett, and No. 51 a Boone County Maize obtained from Messrs. Archibald & Co., Umzinto.

Of these fifty-one samples only twenty-seven were completely analysed as to their feeding values in the Capetown and Grahamstown laboratories. These, grouped according to Provinces, yielded the following average results:—

| Province. | Number of Samples. | Water. | Proteins, N × 6·25. | Fat. | Digestible Carbo-hydrates. | Fibre. | Ash. | Phosphoric Oxide. | Fuel Value: Calories per pound. | Nutrient ratio. |
|---|---|---|---|---|---|---|---|---|---|---|
| Cape ... | 13 | 11·79 | 9·39 | 5·06 | 70·97 | 1·47 | 1·31 | ·606 | 1668 | 8·8 |
| Transvaal ... | 2 | 11·73 | 8·97 | 5·62 | 71·30 | 1·05 | 1·33 | ·722 | 1688 | 9·4 |
| Orange Free State | 12 | 9·80 | 10·14 | 4·73 | 72·52 | 1·53 | 1·28 | ·495 | 1697 | 8·3 |

Orange Free State maize seems to contain less water and therefore more proteins and carbohydrates than Cape maize. At all events the percentages of carbohydrates in Nos. 19, 21, and 27 are decidedly high, particularly when compared with the figures given in the following table:—

| | Water. | Proteins. | Fat. | Digestible Carbo-hydrates. | Fibre. | Ash. | Fuel Value: Calories per pound. | Nutrient ratio. |
|---|---|---|---|---|---|---|---|---|
| I ... ... | 15·0 | 8·2 | 3·8 | 68·7 | 1·9 | 1·4 | 1553 | 9·4 |
| II ... ... | 13·35 | 9·45 | 4·29 | 69·33 | 2·29 | 1·29 | 1606 | 8·5 |
| III ... ... | 10·07 | 10·56 | 4·96 | 71·22 | 1·74 | 1·46 | 1689 | 7·8 |
| IV ... ... | 10·15 | 9·70 | 5·13 | 71·22 | 2·28 | 1·53 | 1680 | 8·5 |

In this table I represents the average results of seventy-seven analyses of corn (maize) meal used for fodder from "Chemical Composition of American Food Materials," Atwater and Bryant: United States Department of Agriculture, Office of Experiment Stations, Bulletin No. 28 (revised), 1899, p. 56.

II is the average of analyses of maize (Indian corn) given by Dietrich and König: "Futtermittel," 1891, Vol. I, p. 524.

III is the average of a very large number of analyses of American Flint corn compiled from König's "Chemie der menschlichen Nahrungs und Genussmittel," Vol. I, p. 553.

IV is a similar average of American Dent corn, based on data from König, *op. cit.*, p. 556.

It must, of course, be borne in mind that the high percentages of water in the maize analyses quoted in the last table are responsible in part for the low carbohydrate percentages. If the maize samples mentioned in the works of reference quoted had first been *dried* down to the natural (air-dry) condition of the Orange Free State samples—that is to say, if their water percentages had been reduced by drying

from 15 and 13 to 9.80—their digestible carbohydrates would have been increased to the following proportions, which do not differ greatly from those of the Orange Free State samples:—

| | |
|---|---|
| I ... ... ... ... | 72·90 |
| II ... ... ... ... | 72·17 |

The following table gives the averages of the analyses performed in the Pretoria laboratory (exclusive of sample No. 8):—

| | Water. | Proteins. | Ash. | Phosphoric Oxide. |
|---|---|---|---|---|
| Transvaal and Vryburg (16 analyses) ... ... | 7·94 | 10·31 | 1·17 | ·45 |
| Natal (7 analyses) ... ... ... ... ... | 8·60 | 9·76 | 1·22 | ·59 |

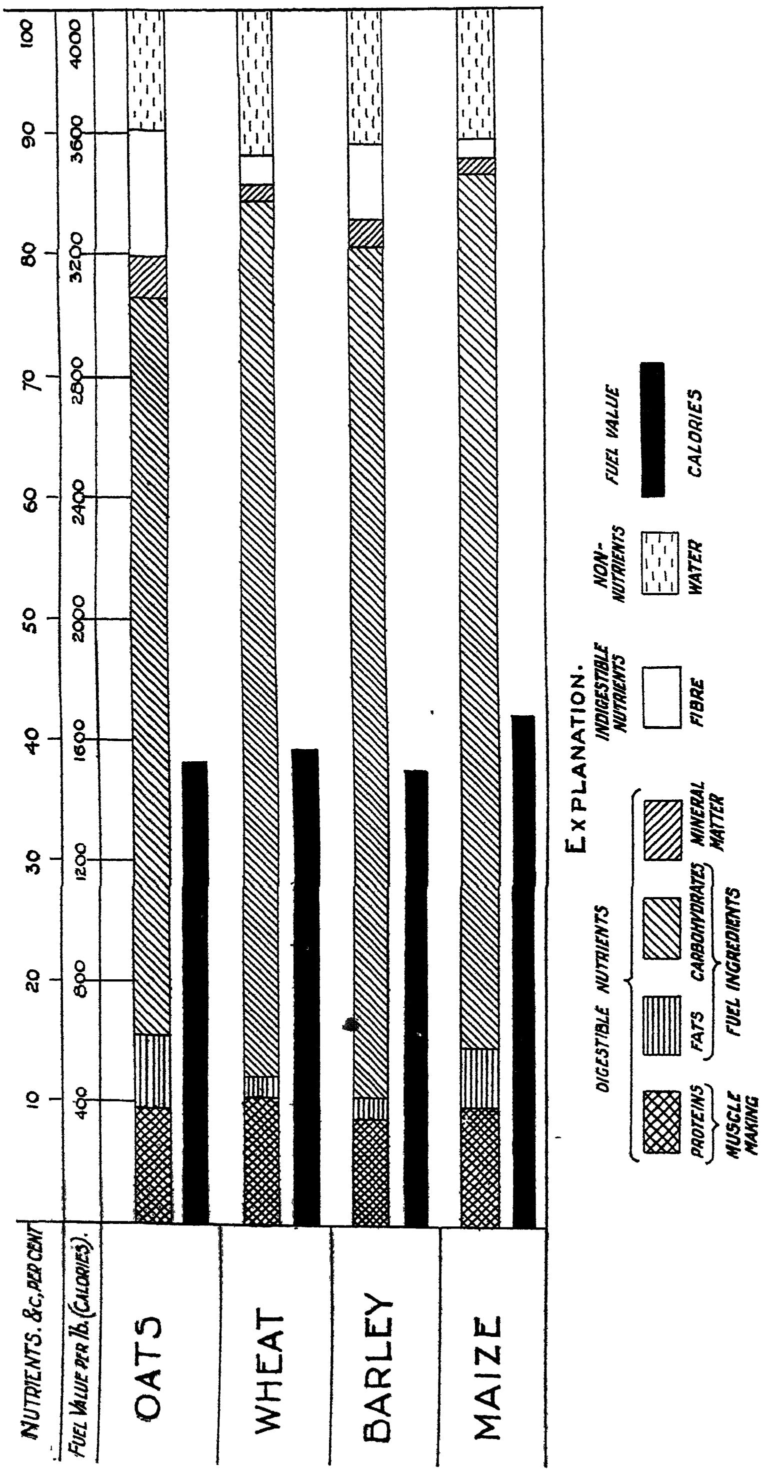
The dry substance of the samples represented would have the following percentage composition:—

| | Proteins. | Ash. | Phosphoric Oxide. |
|---|---|---|---|
| Transvaal and Vryburg ... ... ... ... | 11·20 | 1·27 | ·49 |
| Natal ... ... ... ... ... ... ... | 10·68 | 1·33 | ·64 |

The following table shows the composition of the dry substance of maize (1) from Atwater and Bryant's Bulletin on American Food Materials, (2) from Dietrich and König's "Futtermittel," p. 524, (3) from König's "Nahrungs und Genussmittel," American Flint corn, p. 553, (4) from König, *op. cit.*, American Dent corn, p. 556, (5) from the Cape Province, (6) from the Orange Free State, and (7) from the Union of South Africa, comprising (5) and (6), together with the two Zandspruit samples (Nos. 31 and 32):—

| | Proteins. | Fat. | Digestible Carbo-hydrates. | Fibre. | Ash. | Fuel Value. |
|---|---|---|---|---|---|---|
| Atwater & Bryant ... ... ... | 9·6 | 4·5 | 80·8 | 2·2 | 1·7 | 1827 |
| Dietrich & König ... ... ... | 10·91 | 4·95 | 80·01 | 2·64 | 1·49 | 1853 |
| American Flint Corn ... ... | 11·74 | 5·51 | 79·19 | 1·94 | 1·62 | 1878 |
| American Dent Corn ... ... | 10·80 | 5·71 | 79·26 | 2·54 | 1·70 | 1870 |
| Cape... ... ... ... ... | 10·65 | 5·74 | 80·46 | 1·67 | 1·49 | 1891 |
| Orange Free State... ... ... | 11·24 | 5·24 | 80·40 | 1·70 | 1·42 | 1881 |
| S. A. Union... ... ... ... | 10·88 | 5·57 | 80·46 | 1·64 | 1·46 | 1887 |

We may now summarize in a single table the results of the various analyses of South African grown oats, wheat, barley, and maize which have been fully analysed and discussed above,


NUTRIENTS. &c, PER CENT
FUEL VALUE PER lb. (CALORIES).
10 20 30 40 50 60 70 80 90 100
400 800 1200 1600 2000 2400 2800 3200 3600 4000
OATS
WHEAT
BARLEY
MAIZE
EXPLANATION.
DIGESTIBLE NUTRIENTS
INDIGESTIBLE NUTRIENTS
NON-NUTRIENTS
FUEL VALUE
PROTEINS
FATS
CARBOHYDRATES
MINERAL MATTER
FIBRE
WATER
CALORIES
MUSCLE MAKING
FUEL INGREDIENTS

| Cereal. | No. of Analyses. | Water. | Proteins, N × 6·25. | Fat. | Digestible Carbo-hydrates. | Fibre | Ash. | Phosphoric Oxide. | Lime. | Fuel Value. | Nutrient ratio. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Oats ... | 52 | 9·85 | 9·44 | 6·03 | 60·86 | 10·20 | 3·62 | ·56 | ·102 | 1523 | 7·9 |
| Wheat ... | 37 | 11·97 | 10·24 | 1·83 | 72·13 | 2·33 | 1·50 | — | — | 1573 | 7·4 |
| Barley ... | 30 to 47 | 11·24 | 8·75 | 1·69 | 69·99 | 6·14 | 2·39 | ·62 | ·082 | 1501 | 8·4 |
| Maize ... | 27 | 10·90 | 9·69 | 4·96 | 71·69 | 1·46 | 1·30 | ·56 | — | 1681 | 8·6 |

The figures included in the last table are also represented graphically in the appended diagram.

The percentage composition of the dry (i.e. absolutely water-free) grain of these cereals would be as follows:—

| Cereal. | Proteins, N × 6·25. | Fat. | Digestible Carbo-hydrates. | Fibre. | Ash. | Phosphoric Oxide. | Lime. | Fuel Value. |
|---|---|---|---|---|---|---|---|---|
| Oats ... ... ... | 10·48 | 6·69 | 67·51 | 11·31 | 4·02 | ·62 | ·113 | 1689 |
| Wheat ... ... ... | 11·63 | 2·08 | 81·94 | 2·65 | 1·70 | — | — | 1787 |
| Barley ... ... ... | 9·86 | 1·90 | 78·85 | 6·92 | 2·69 | ·70 | ·092 | 1691 |
| Maize ... ... ... | 10·88 | 5·57 | 80·46 | 1·64 | 1·46 | ·63 | — | 1887 |

So we see that in fat, which is the most concentrated fuel-constituent in a fodder, the richest grain of the four is the oat, maize coming next; but the much larger proportion of digestible carbohydrates in maize more than counterbalances its smaller proportion of fat, and places it in the front rank in regard to its fuel value. Voorhees * says that maize gives the largest yield of digestible dry matter per acre of any crop that is now grown. In the above tables the small percentage of indigestible fibre in maize—scarcely more than one-tenth that of oats—should be noted. In proteins barley is lower than any of the other Cape cereals analysed, whilst maize shows the highest average.

* "Forage Crops," p. 132.

# Two Interesting Species of Fish from the Neighbourhood of Pretoria.

By Paul A. Methuen, F.Z.S., Assistant at the Transvaal Museum, Pretoria.

During the month of May the Transvaal Museum received two very interesting species of fish which had been caught in the dam at Hamanskraal. The first specimen we received, that of the "beaked fish," was from the Station Master at Hamanskraal, Mr. Schnetler. Later Messrs. A. Wolff and Siebert went over to Hamanskraal and obtained a good many specimens of the "beaked fish" and of the so-called "bastard barbel," which they very kindly presented to the Museum.

The particular interest associated with the occurrence of these fish near Pretoria lies in the fact that the first mentioned has but very rarely been taken in the Transvaal—a few have been recorded from the Crocodile and the Sabi Rivers—and that the second has not previously been taken south of the Zambezi, as far as we know.

Mr. Boulenger in his recent monograph on the fishes of Africa states that the "bastard barbel" (*Synodontis zambesensis*, Pet.) is found from Webi Shebeli to the Zambezi, and also from Lake Nyassa.

The "beaked fish" (*Gnathonemus macrolepidotus*, Pet.) is of further interest in that it belongs to a primitive family which is at the same time in many ways highly specialized. This family has its headquarters in the "Nile and the fresh waters of tropical Africa," while rather more than two-thirds of the species of the genus *Gnathonemus* are found in the Congo State and in the Niger River, the rest being recorded from West and East Africa within the tropics, from the Nile, and a single species from Angola.

The record of these two fish from the Pretoria District leads us to conclude that the fauna of the Crocodile River system must evidently be of a more tropical nature than has been supposed hitherto. However, more extensive collections than have been made up to the present from the Transvaal rivers are required before the affinities of the fish fauna of this Province to that of the tropics can be ascertained. And in this connection we would like to state that we shall always be pleased to receive specimens of fresh water fish for our collections.*

* All specimens of natural history travel free of cost within the Union, if labelled as such and addressed to "The Director, Transvaal Museum."

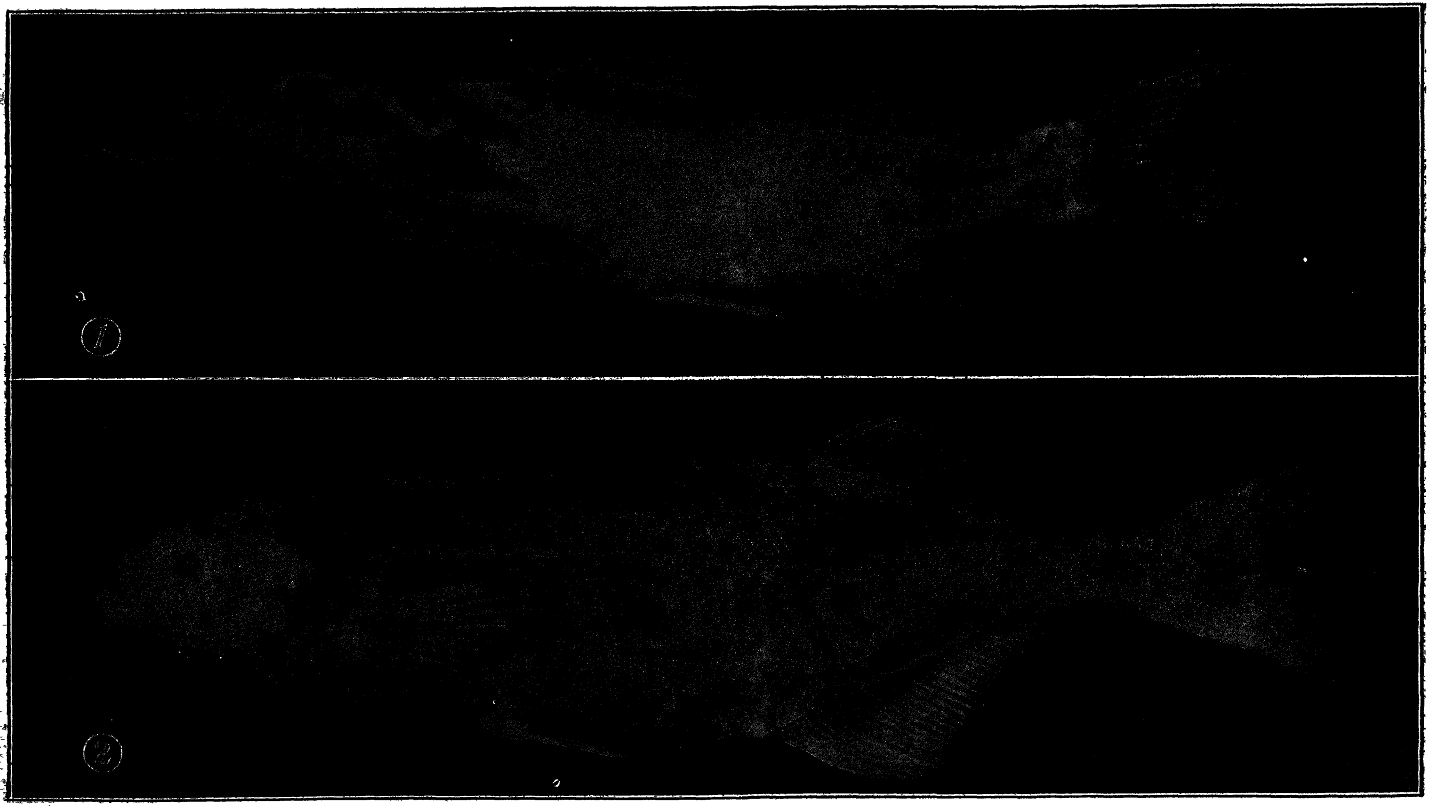


*Plate No. XLIV.*
Fig. 1. The "Bastard Barbel" (*Synodontis zambesensis*, Pet.). Fig. 2. The "Beaked Fish" (*Gnathonemus macrolepidotus*, Pet.)
Both specimens from Hamanskraal.

# Epizootic Lymphangitis and its Treatment.

By A. F. HARBER, Government Veterinary Surgeon, Durban.

THE history, nature, and symptoms of this disease will be dealt with in this article in as simple and practical a manner as possible, but it is the results which I have obtained in its treatment to which I wish to draw special attention.

The disease has been known in countries in the East, as India, China, Japan, etc., for a very considerable time; it is also prevalent in other parts of the world, such as the Philippines, Mauritius, Northern Africa, and parts of Europe. It was introduced into the British Isles from this country by military horses at the conclusion of the late war, but it was successfully dealt with by stamping out. I think, however, that the conditions there are not so favourable to its spread and development as in other countries. As regards this country, it is really a relic of the war, having been introduced from the East.

Although the disease has existed so long in some parts, treatment, either preventive or curative, has met with little success.

Epizootic lymphangitis is a disease of equines affecting the lymphatic system of the skin and underlying parts, and is caused by an organism or microbe known as a "cryptococcus." The organism enters the body through a wound, causing an inflammation of the parts invaded, and produces symptoms or lesions more or less well marked. These lesions take the form of pustules, or "buds," as they are known, and sores or ulcers which appear at various parts along the course of the lymphatic vessels, and these vessels themselves also become thickened, giving them a "corded" appearance. This condition is seen in the majority of cases affecting the limbs, that is "an unmistakable cording with buds or ulcers" at irregular intervals. The buds and ulcers correspond to the situation of the lymphatic glands which exist along the course of all the lymphatic vessels.

The lesions may appear at any part of the body, but as already stated the parts most commonly affected are the limbs on the inner parts of the thigh and arm; the reason being that the legs are more subject to wounds from kicks or other injuries, pricks from thorns, etc.

The disease is of a very infective nature, but the infection spreads comparatively slowly from the seat of entrance into the body, and is more or less localized, except in a few instances where it spreads rapidly and may become generalized, which may kill the animal from exhaustion or "toxaemia," or both.

From my experience the disease appears to spread more rapidly in the donkey than in other equines.

In some cases the lesions are accompanied with a good deal of inflammatory swelling, and in these cases the cording of the lymphatics is not so marked, but the ulcers and buds are generally numerous, and usually arranged in linear fashion, showing the situation of the lymphatic vessels. Such cases as these I find are more obstinate to treat and require more constant supervision.

Infection in this country (Natal) has confined itself principally to the coastal districts, though it has taken place more inland at much higher altitudes, where it has not been so difficult to cope with by the method in vogue of stamping out and quarantine.

The procedure briefly is as follows:—

Pus smears are prepared from any suspicious sore and microscopically examined (I would mention that microscopical examination is the only definite method of diagnosis, but if one has had experience the clinical characters of the disease are usually sufficient, but in any case the diagnosis should be verified, and this as early as possible). If the case is reported as positive the affected animal was destroyed, and the carcass suitably disposed of. All in-contact material, such as harness, poles, and shafts, swingle bars, trek chains, etc., or anything that could possibly have become infected, was suitably disinfected, even to the attendant's hands. The stable was properly treated, or even destroyed. The in-contact animals were permitted to work under permit (open quarantine) between stated points, as long as no suspicious lesions existed, and were not allowed to enter any other stables or premises. Yet, with all these precautions, the disease continued to occur.

It appeared to me that if the disease could survive after all such preventive measures had been taken, there must be some other means by which the infection was carried, and this was probably "flies."

With the object of preventing the attack of flies to a wound, a mixture of stockholm tar and oil was used in the proportion of one of tar to three or four of oil; castor-oil is best, I think, as, it being of a thick consistency, adheres better. Stockholm tar is cheap, a good antiseptic, can be obtained at almost any house in the country, and I know of nothing better to keep off flies.

This mixture is applied to all wounds, no matter what their size or how caused, and all owners of equines, particularly those in the vicinity of an outbreak, are advised to use it regularly as a precautionary measure.

This is done because I think that the organism can exist almost anywhere in the soil under suitable conditions; in a similar manner as the organism of certain other diseases, notably "tetanus."

This theory, if correct, may explain the source of many outbreaks where the origin of the infection is obscure, that is, in those instances where odd cases take place some distance from the nearest known outbreak, and between which there has been no communication, the organism being picked up near at hand or possibly carried by flies, which are credited as being able to travel a good number of miles.

With the adoption of this preventive treatment the results have been very satisfactory, as the following facts will show:—

In twelve months the number of areas in quarantine has been reduced from forty to four, where previously cases were continually taking place at longer or shorter intervals, thus extending the quarantine period, as for example:—

One owner had been under restrictions for three years, and another nearly two years, with the loss of thirty-three and twenty-seven animals (destroyed) respectively, the cases occurring at intervals of from four to eight weeks. No more cases have occurred at either of these places since the preventive measures have been carried out.

## Schedule.

| No. | Subject and Lesions. | Date Treated. | District. | Result. | Remarks. |
|---|---|---|---|---|---|
| 1 | Donkey stallion. Buds and ulcers on prepuce abdomen, and inside thighs contracted from a badly infected mare | 11th September, 1912 | Verulam | Cured | A simple case. |
| 2 | FOUR *cases among a span of* donkeys. Infection on both fore and hind legs (thighs and arms), also on the abdomen and chest | 10th October, 1912 | Sinquazi | Cured. (FOUR) | Two of these cases were somewhat severe with much thickened lymphatic vessels. |
| 3 | Horse. Severe infection the whole length of one fore leg extending through the axilla into the proscapular gland which was the size of a large cocoanut | 20th November, 1912 | Chakas Kraal | Destroyed 24th November | A severe case, which in a few days was rapidly spreading. |
| 4 | Horse. Infection on side of chest and abdomen, associated with much inflammatory swelling | 18th January, 1913 | Port Shepstone | Cured | Severe case, the swelling extending from brisket to near sheath. Was treated a second time. Patient died from horse-sickness, but lesions had all healed, and swelling dispersed. |
| 5 | Horse. Buds and ulcers extending from the near eye over masetter muscle and down the jugular furrow to near the point of the shoulder. The submaxillary gland of the same side was also involved, cording of the lymphatic vessels was well marked. | 12th January, 1913 | Mount Edgecombe | Cured | Not severe, except over the masseter muscle where the lesions were diffuse. |
| 6 | Horse. Infection on near ribs, ulcers and buds with corded lymphatics associated with inflammatory swelling | 18th April, 1913 | Port Shepstone | Practically cured | A severe case, treated twice. |
| 7 | Mule. One lesion and ulcer on near ribs ... ... ... ... | 9th May, 1913 | Nonoti | Cured | Simple case. Died afterwards of horse-sickness. |
| 8 | Mule. Ulcers and buds on chest and ribs, extending on one side down the foreleg and posteriorly over the abdomen to near the mammary gland | 9th May, 1913 | Nonoti | Cured | Severe case. Patient died of horse-sickness, but wounds all healed before death. Twenty-three places treated. |
| 9 | Horse. Buds unbroken on both fore arms extending under the axillae and over the shoulder joints, and a few lesions also on the ribs of one side | 9th May, 1913 | Nonoti | Cured | Severe case. Twenty-five places treated. |
| 10 | Donkey. Lesions inside one arm and thigh with corded lymphatics | 20th May, 1913 | Sinqu zi | Cured | Not severe, treated again 16th June, 1913. |
| 11 | Donkey. Buds inside one thigh ... .. ... ... ... | 28th May, 1913 | Sinquazi | Cured | Simple case. |
| 12 | Donkey. Buds and ulcers with corded lymphatics extending from the hock to the groin, also inside arm under the axilla and over shoulder joint | 16th June, 1913 | Sinquazi | Destroyed 8th August | A severe case, associated with much cording of of the vessels. |

TOTALS.—Number treated... ... ... 15

Destroyed ... ... .. ... 2
Cured ... .. ... ... 13

15

I mention these facts to show that if flies are kept away from wounds the chances of infection are at least reduced to a minimum.

## TREATMENT.

Epizootic lymphangitis is usually described as being practically incurable, and no method hitherto adopted has given satisfactory results. Recoveries have, however, been brought about by the application of certain caustics, more or less violent; also surgically, by total extirpation of the affected parts, including the skin covering them. These methods cannot, however, be adopted without risk if the affected area is large or in the near vicinity of large vessels or other important structures; the length of time the resulting wounds take to heal is also a consideration.

My object was to obtain an effective and as simple a remedy as possible, and the results as shown in the attached schedule are, I consider, so satisfactory that I feel justified in continuing on the same lines.

Mr. W. M. Power, the Senior Veterinary Surgeon, Natal, is also satisfied with the results obtained, and in fact has decided to put the treatment now described into practice in any other part of the Province where the disease may make its appearance.

The buds are opened, preferably by a cross incision, to thoroughly expose the interior; the cavity is well curetted or scraped out (this is important) so as to remove as much of the infection as possible with the instrument. The exposed surface is then filled with crystals of permanganate of potash—each bud being treated similarly. The ulcers as a rule have no cavity and require only to be well scraped with the scalpel and the crystals applied. If the lymphatic vessel is much thickened, this is also opened and treated the same way, though if there is no undue swelling they are left, as I find they usually disappear; if not, they can, of course, be treated later.

In those cases associated with much inflammatory swelling, a little iodine, arsenic, and resin given internally helps to disperse the swelling, though in mild cases this is unnecessary.

The parts around the wound are dressed with the tar and oil previously mentioned, which only requires to be renewed every few days.

The subject is, of course, isolated, and any further treatment required is carried out as before, though in simple cases no more treatment is necessary, and the wounds heal in from two to eight weeks.

Up to the present there does not appear to be any sign of the disease recurring in those treated, the first case being ten months ago, and is still healthy and in regular work. The animals will, however, not be lost sight of, and will be inspected as occasion offers, as the disease has been known to reappear some considerable time after apparent recovery. Further, I would impress upon owners the necessity of at once reporting the existence or suspicion of the disease in order that it may be definitely diagnosed, as no treatment can be carried out safely until this has been done, and epizootic lymphangitis is a disease scheduled under the Animals Diseases Act, and notification of outbreaks to the proper authorities is not optional, but compulsory.

The crystals stain the hands a good deal, but this can be removed with pumice stone.

Mr. Stordy, the Principal Veterinary Surgeon of British East Africa, who was staying here a short time ago, was much interested in this matter, and he informed me the disease is prevalent in that part of the country, as is also another form of lymphangitis known as "ulcerative lymphangitis" which, clinically, is indistinguishable from the "epizootic" form, but differs microscopically, and, further, has not, as yet, yielded to any form of treatment.

Mr. Stordy promised to try the treatment adopted and carried out by me with such satisfactory results, and I shall be interested to hear of his experience and of any others who may now decide to give the treatment indicated above a trial.

NOTE.—I wish to add that the method of staining for microscopical examination is that used by Mr. A. Goule, Government Veterinary Surgeon, Pietermaritzburg, and which I have found has given better results than any other tried by me. It is quick, gives excellent results, and is applied as follows:—A few drops of a saturated alcoholic solution of gentian violet are placed on the smear with an equal quantity of water; staining is complete in three minutes; wash, dry, and examine in usual manner.

# A List of Grahamstown Weeds.

By FREDERICK S. SALISBURY, M.A., Cantab., of Kingswood College.

ALL the plants in this list occur as weeds within the actual limits of the Municipality of Grahamstown. A few cosmopolitan weeds are included, and others which may be native of some part of South Africa, though apparently introductions here. The great majority are natives of Europe or America. Omissions will no doubt be detected by those who have to cope with the invaders in field and garden, as the writer has mentioned none which he has not personally observed and determined. The species marked with a star are not included in the 1909 list of Albany and Bathurst plants.

### FUMARIACEÆ.

*Fumaria officinalis.* Fumitory. Called pink-weed in Australia from the colour of its flowers, which are narrow, about a third of an inch long, and reddish pink tipped with darker red, and are arranged in racemes. Occurs on cultivated soil and at foot of fences. It is generally, and in the open always, only a few inches high, but if it grows among bushes or in a hedge it climbs by its leaves and leave stalks and then attains several feet in length. The latter form is to be seen in the fence by road leading down past the Grand Hotel out of High Street. The herbage, according to the Encyclopædia Britannica, Ed. XI, is used in China under the name of Tsze-hwa-ti-ting as an application for glandular swellings, carbuncles, and abscesses.

### CRUCIFERÆ.

*Nasturtium officinale.* Watercress. In bed of stream, by African Street and elsewhere. Yields, like many cruciferous plants, a pungent volatile oil, which Greenish in his *Materia Medica* states to be principally phenyl-ethyl isothiocyanate ($C_8H_9NCS$) in this species. Watercress produces elongating racemes of white flowers. They yield honey, and attract insects in spite of their individual smallness by being clustered in a corymbose manner at the top of the raceme during their blossoming stage. But if the weather is wet and prevents insects from visiting them they are self-fertilized. This double provision ensures their prolific multiplication.

*Sisymbrium officinale.* Hedge mustard. A rigidly branching plant with racemes of minute yellow flowers. These are succeeded by rough pods which are pressed close against the stem. Produce honey, but are rarely visited, according to H. Muller in *Fertilization of Flowers*, and consequently have the power of self-fertilization in default.

*Senebiera pinnatifida.* Lesser Swine-cress. A weed of waste ground. Native of the Argentine: naturalized also in Europe and Australia.

*Capsella bursa-pastoris.* Shepherd's purse. Flowers small white at the top of racemes which lengthen as the seed sets. Pods small and triangular on slender spreading stalklets. Has accompanied cultivation all over the world, and another of its appropriate popular names is "pick-pocket." Visited by various insects, but otherwise self-fertilized. Muller found that specimens which he kept in a room and protected from insects were fully productive.

### CARYOPHYLLEÆ.

*Silene gallica.* French catchfly. Somewhat sticky just below flowers. It is an annual about eight inches high, introduced from Europe, but has been in South Africa more than half a century at least. Sonder gives it in the first volume of the *Flora Capensis*, and notes that it was called "gun-powder weed" by the Colonists on account of its black seeds resembling gunpowder.

*Stellaria media.* Chickweed. Flowers all the year round, and its inconspicuous little white blossoms depend largely on self-fertilization. An annual; native of Europe.

*Cerastiun viscosum.* Mouse-ear Chickweed. Moist pasture under shade of bushes. Cosmopolitan.

### PORTULACEÆ.

*Portulaca oleracea.* Common purslane. Established in most warm countries and cultivated as a pot herb from ancient times, from which it derives its specific name "Oleracea." Decandolle in *Origin of Cultivated Plants* quotes the names of lonico, andrachne, and portulaca as its Sanskrit, Greek, and Latin names respectively. From a review of the evidence he concludes that the plant is indigenous in the whole of the region which extends from the western Himalayas to the south of Russia and Greece, but is elsewhere introduced. Its medicinal properties were early recognized and the martyr to gout in Lucian describes how the doctors pounded up plantain, parsley, lettuce, wild purslane, and many other herbs as remedies.

### MALVACEÆ.

* *Malva nicaeensis.* Mallow of Nice. Has broadly ovate bracts on the outside of the calyx, which closes over fruit.

*Malva parviflora.* Small flowered mallow. Has linear bracts on the outside of calyx, which spreads widely in fruit. These two mallows occur

here as comparatively low growing and often quite prostrate plants on roadside wastes, though in South Australia, where both also occur, *M. parviflora* is often erect and two feet or more in height.

* *Sida rhombifolia.* A low bushy plant with yellow flowers, very like the native Sida longipes, but distinguished by having sharp points on the fruitlets which compose its otherwise flat mallow-like "cheeses." For this reason it is irritating to stock in its fruiting stage. Occurs near Stone's Hill and by several roadsides at the south end of Grahamstown. Widely spread in eastern Australia and Africa and other warm parts of both hemispheres. In the Transvaal it is known as Pretoria weed. Oliver records the plant in his *Flora of Tropical Africa* from the Niger, Senegambia, White Nile, and Congo. Attempts have been made to use the fibre of this species for textile purposes.

GERANIACEÆ.

*Erodium moschatum.* Musk stork's bill. Has feather-cut leaves, small pink flowers and long-beaked fruits. A common roadside weed. Native of Mediterranean region, North Africa, and Abyssinia. Harvey states that it is sometimes cut for fodder, since it is a strong growing plant, and sometimes grown in gardens for its musky fragrance; but the latter is only very slight.

*Oxalis corniculata.* Beaked oxalis. Grows in nearly all warm countries. Has yellow flowers, trefoil leaves, acid in flavour, and pod-like fruits. Common at foot of fences and on cultivated ground.

LEGUMINIFERÆ.

* *Trifolium angustifolium.* Narrow-leaved clover. Only a single locality noted here, but was apparently introduced into the Colony at an early date, since in Vol. II of the *Flora Capensis*, published 1861–1862, Harvey speaks of it as naturalized near Capetown, Simons Bay, the Paarl, etc., and it is referred to as a worthless plant under the name of wilde rooi gras in S. W. Silver & Co.'s Handbook to South Africa (1875). It is a hairy plant with very narrow leaflets, and the long-pointed calyx lobes become rigid and spreading in fruit, while they persist on the dry stems long after the plant is dead and make an undesirable and irritating ingredient in pasture. Native of South Europe.

*Medicago denticulata.* Toothed medick. Annual, with small heads of minute yellow flowers. A widely distributed weed. Oliver in the *Flora of Tropical Africa* (1871) notes it for Abyssinia, and observes that it had also reached Japan, the United States, Chili, India, and New Zealand, to which may now be added Australia and South Africa. The fruits assume the form of a flattened spiral with burred flanges. Native of Europe.

**Medicago sativa.* Lucerne. Becomes a weed by roadsides, and is of course an escape from cultivation. Its origin from south-western Asia is well attested, and it appears to have been brought into Europe about 470 B.C. after the Persian war. Vergil in the first Georgic refers to the sowing of lucerne in spring on land prepared by the plough.

(*To be continued.*)

# Advertising South African Fruit.

## THE EXHIBITIONS ON THE CONTINENT.

WITH reference to the note and illustrations which appeared in our July issue regarding the efforts which the Union Trades Commissioner in London (Mr. Chiappini) is making in the direction of advertising South African fruit on the continent of Europe, the following report, dated 13th June, which has subsequently been received from Mr. Chiappini, gives further details as to what has so far been accomplished :—

It was my experience that, in endeavouring to extend the continental markets for South African fruit, the chief difficulty was the fact that even many of the leading fruit dealers on the Continent were, for all practical purposes, unacquainted with the classes, varieties, and characteristics of that fruit. I therefore submitted a proposal to hold exhibitions of South African fruit at Paris, Hamburg, and Berlin. It was subsequently intimated to me that the Right Honourable the Minister of Agriculture "entirely concurred in the proposal," and that the Agricultural Department would "take steps to approach fruit growers for the necessary supplies." I was also advised that about 100 boxes per week had been promised by the fruit shippers.

My original proposal was that the displays should be held at each of the centres named, for a period of say four or six weeks. It was, however, suggested by the Western Province Fruit Growers' Union that the exhibitions should be extended to a period of about two months, but owing to the numerous difficulties which were encountered it was found to be impossible to carry them on for more than about four weeks at each centre.

### PARIS.

The exhibits at this centre were opened on the 12th February, I had the benefit of the valuable assistance of Mr. J. Meadows-Smith, the Secretary of the British Chamber of Commerce. Mr. Meadows-Smith introduced me to M. L. Hollier, a prominent wholesale fruit dealer in Paris. I was also introduced to M. L. Fontaine, the President of the Fruit Section of the French Chamber of Commerce at Paris, and who is a large dealer in high-class fruit. I am much gratified to be able to record my obligation to the aforementioned gentlemen, and to acknowledge their kind co-operation and much valuable assistance.

In consequence of my efforts to secure suitable premises having failed, my original intention of holding a small exhibition in one building, for a period of about a month, had necessarily to be abandoned. As a result of consultation with the gentlemen who were kindly assisting me, it was agreed to arrange with about eight of the leading fruit dealers to exhibit the South African fruit in their windows for a week each; the windows to be used solely for that purpose; two such shop displays to be held concurrently. In each instance it was announced, by means of a large card, that the display was an exhibition of South African fruit, held under the auspices of the South African Government; the windows were neatly decorated with Union flags; whilst the fruit was tastefully arranged in a

manner calculated to attract the most attention. A card was also prominently displayed inviting inquiries to be addressed to this Department. Very favourable comments were passed by wholesale and retail dealers and consumers; as also by the Press.

I personally made notes, from observations on the spot, as to the classes and varieties of South African fruit most appreciated on the French markets. However, I deemed it well to secure the opinion of M. Hollier on the point, and I give a summary of his views :—

"The fruits likely to be sold in large quantities on the French markets are :—

"*Apricots:* Big fruit, nicely coloured.

"*Peaches:* Especially nice coloured ones; not small fruit. They should arrive not later than the beginning of April, as the French season for hot-house peaches then commences.

"*Plums:* 'Kelsey' and 'Wickson'; also red flesh plums, nicely coloured.

"There is not a very large demand for *Nectarines*; only a few cases wholesale.

"French pears and apples are nicely kept by means of refrigerators; so that pears and apples from South Africa have no chance of success.

"The Muscat grapes 'Hanepoot' (black and white) would only be asked for a little. They must arrive in good condition."

### HAMBURG AND BERLIN.

A week after the opening of the display in Paris, I proceeded to Hamburg. The conditions prevailing in Germany differ entirely from those in France, and other arrangements had to be concluded.

At Hamburg and Berlin I was fortunate in securing the assistance of Mr. Gustaf Schonfeld, a very well-known wholesale merchant, who took charge of the arrangements on my behalf.

After considerable trouble and negotiation, it was arranged that, at both Hamburg and Berlin, exhibitions should be held for four weeks in the Central Fruit Market. After being exhibited in the market, the fruit was displayed in a prominent shop window at each centre—the window being entirely devoted to this purpose. The window so secured at Hamburg was that of a leading firm of high-class fruiterers, Messrs. Heimerdinger. At Berlin a window was secured in the well-known establishment of Messrs. Wertheim, one of the largest and most beautifully arranged shops in the world.

Arrangements for the leasing of a stand had to be completed with the authorities in charge of the Central Fruit Markets at Hamburg and Berlin. There were "regulation" difficulties in this respect, but these were overcome.

As at Paris, so in regard to the displays at Hamburg and Berlin: the fruit was most tastefully arranged and decorated, and cards were prominently placed announcing that the exhibits were held under the auspices of the Government of the Union of South Africa, and that all information could be obtained upon inquiries being addressed to this Department.

After the fruit had been exhibited for a week or more (and when fresh supplies had arrived) that which was still quite sound was repacked and sold: the proceeds being put as a "set-off" against the cost of supplies which it was necessary for me to purchase to augment those donated by the growers. I issued strict instructions—and they were rigidly carried out—that only fruit which was perfectly sound was to be sold.

I now give the opinion of Messrs. Gustaf Schonfeld & Co. as to the classes of fruit which are most likely to gain a satisfactory place on the German markets :—

"*Peaches* : The demand is for really fine and big fruit—not for small fruit.

"*Grapes* : Several shipments arrived here this season and the South African grapes are thus becoming known. We recommend packing in small boxes, large boxes being almost unsaleable. The greatest care must be taken in packing. Some grapes arrived in a wet condition during the last season, and repacking was necessary in order to secure fairly good prices. Too many grapes in one box must be avoided as otherwise the fruit suffers through pressure.

"*Pears* : 'Beurre Hardy' and 'Duchesse' are greatly in favour in Germany; the former proving a very durable fruit. 'William Bon Chretien' have not the same fine taste, and, as they ripen quickly, their export to Germany might be somewhat dangerous.

"*Melons* : The experience with this fruit, up to now, is not such as to make it likely that the German requirements will greatly expand.

"*Pineapples* : The South African pines hitherto received have proved to be rather dry; and thus high prices have not been realized. This class of fruit is most important for the German market, and next season's experience will prove whether the prices realized are sufficiently remunerative to the farmers.

"*Plums*: There is a good demand, but the fruit must be hard and firm. The different varieties are equally in demand, save that for 'Apple Plums' about *M*.1.50 per box above prices for other varieties may generally be obtained."

### General.

Prior to the opening of the exhibitions and during their course, suitable notices were arranged in the French and German Press, drawing attention to the displays. Advantage was taken of the exhibitions to distribute literature advertising South Africa generally. It was my pleasure to answer numerous inquiries as to the fruit export trade of South Africa and on other matters.

The following are the classes and varieties of South African fruit displayed :—

*Peaches* : Early Alexander, Royal George, Duke of York, Old Cape, Sea Eagle.

*Plums* : Apple Plums, Satsuma, Kelsey, Wickson, Chalcots.

*Pears* : William Bon Chretien, Beurre Hardy, Beurre Bosc, Louise Bonne, Winter Nelis.

*Grapes* : Red Hanepoot, White Hanepoot, Barbarossa, Gros Colman, Raisin Blanc, Waltham Cross.

*Pines* : Small Queen.

*Melons* : Winter.

About one-half of the fruit used was donated for the purpose by the shippers in South Africa, through their agents in England, but, as this quantity fell far short of what the Department had been promised, additional supplies had necessarily to be purchased to maintain the exhibitions in a reasonably fitting manner. A series of "starved" exhibitions would have done more harm than good.

I regret that I had occasion to be somewhat disappointed with the degree of support extended to me by some of the English consignees, or

the agents for the shippers. Some agents gave no support and made difficulties in handing over the fruit which, as I gathered from official reports from South Africa, had been promised by the shippers. The reason offered for such action was, in effect, "that the exhibitions would interfere with their own business arrangements on the Continent." However, one or two of the chief receivers of South African fruit were exceptionally helpful and rendered every possible support. It is only on account of my general custom not to mention names, in any comparative sense, in an official report upon commercial matters, that I refrain from giving the names of those who were helpful and of those who, as was very evident to me, were hindrances on account of their fear of losing any part of their own business. In one instance I was candidly told by an agent here that the holding of these exhibitions was an excellent scheme to widen the markets, but that he had no interest in the continental markets and he, therefore, regretted that he could not support me.

I would now most fully thank those who did grant supplies, and also express my appreciation of the untiring efforts of the Government Horticulturist in his endeavours to secure fruit from the farmers in the interests of expanding the markets therefor.

Excellent photographs of the exhibitions were recently forwarded to the Government Horticulturist. [Reproduced in our July issue.—Acting Editor.]

The total cost of all the exhibitions at the different centres so far as my Department is concerned was £161. 2s. 3d. This included such items as advertising, rent for certain of the exhibition spaces, printing, the expenses of those gentlemen who, apart from actual out-of-pocket expenses, gladly gave their services free of charge, the purchase of fruit additional to that donated by the growers, freight and rail charges from England to the Continent, continental customs charges, attendants' fees, etc.

I have no hesitation in saying that the exhibitions caused a greater interest than I at first anticipated. Good results should undoubtedly be felt in coming seasons, for hundreds of continental fruit dealers have thus been made acquainted, in a practical manner, with the different fruits which South Africa exports, whilst thousands of the consuming public on the Continent now also know what can be obtained.

The Union-Castle Steamship Company generously carried free of freight the fruit used for these exhibitions, as also that which was utilized for display purposes in this Department's window. I desire fully to acknowledge the Company's kindly action in this respect.

# Geel-Dikkop.

In response to a request by a correspondent for information regarding geel-dikkop, we reprint the following notes by Veterinary Surgeon Dixon which appeared in Vol. XIV of the *Cape Agricultural Journal*:—

Geel-dikkop, so called from the swelling of the head and the yellow serous effusion underneath the skin of the head, is a disease affecting sheep and goats, and very prevalent in portions of Beaufort West and neighbouring districts during the summer months.

This disease usually makes its appearance about the month of December under certain atmospheric conditions, and will continue if these conditions are favourable up to April or even May.

Sheep, especially lambs, are more susceptible to it than goats, and "Merinos" more so than "Cape sheep."

The disease is attributed to several causes. One idea, and a very popular one amongst the farming community, is that geel-dikkop is caused by the eating of a small creeping plant with a yellow flower called the "dubbeltje-doorn," and which, during the summer months, grows luxuriantly on those places in the veld on which the disease is contracted; others state it is due to a small grub that is found embedded in the stalk of the "dubbeltje-doorn," which is swallowed with the plant and supposed to get lodged in the brain by some means or other not easily explained and thereby causing the swelling of the head. I have been shown this grub taken from the head, which I found to be the *Aestrus ovis* found in the frontal sinus. Whilst, again, others attribute it to drinking water under certain conditions during the heat of the day.

From previous observations respecting this disease I was inclined to believe that the eating of this plant under certain conditions was probably the cause, for the disease appeared only when stock were grazed in those places where the dubbeltje grew in abundance.

It never appears except after rains, and the most favourable atmospheric conditions for the prevalency of the disease is rain showers sufficient to bring up this plant, followed by hot winds.

I thought it possible that this plant if eaten when scorched, not dried, became poisonous, and would be capable of producing symptoms and post-mortem lesions similar to that found in geel-dikkop.

I may mention that pans where the plant grows and easily become scorched are likely spots for sheep to contract the disease.

If the rains continue so that the plant remains green, dikkop does not appear notwithstanding the dubbeltje plant grows luxuriantly.

I fed a number of sheep and goats entirely on the dubbeltje, both in a fresh and withered condition, with negative results, but unfortunately for my investigations, as there were only a few isolated cases of dikkop on the farm Kuilspoort where these experiments were carried out, and also on the adjoining farms, I was unable to make the really only critical feeding experiment, i.e. taking the plant from that portion of the veld on which the disease was prevalent at the time.

I inoculated both subcutaneously and intravenously a number of sheep with the yellow serous effusion found beneath the skin of head,

the blood, bile, splenic, liver, and lymphatic pulp solutions taken from affected animals, but with no ill results.

*Symptoms.*—The first symptom noticed is a hanging of the ear or a shaking of the head, and if the animal is caught the ears will be found hot and swollen, and the swelling will extend to the face and between the lower jaws. The temperature is not usually very high for sheep, ranging between 103° and 105° F.

The serous effusion beneath the skin of the head is at first clear, afterwards becoming of a yellow golden colour as soon as the jaundice symptoms show themselves, and which is first apparent in the eye. Within a few days the animal becomes weak and depressed, lying down for a long time.

The faeces are hard and coated with yellowish mucus and sometimes tinged with blood.

The skin over the tumified portions of the head (eyes, lips, and eye-lids) becomes hard and dry, cracks and peels off, leaving ugly sores.

The average duration of the disease is about four to seven days, but sometimes cases will last longer, the affected animals in these cases usually dying from emaciation and bilious poisoning.

*Post-mortem Appearances.*—Jaundiced condition of the whole body and a yellow serous effusion in the connective tissue of the skin of the head and ears.

The liver is congested, sometimes of a deep yellow colour, the bile ducts are engorged with bile, and the gall bladder is distended with bile, which is generally thick and viscid.

The kidneys are enlarged but do not appear to show any structural alteration, and the same with the spleen.

In the digestive track is observed a catarrhal gastritis of the abomasum and inflammatory redness with haemorrhage in the small intestines and catarrhal lesions of the entire intestinal canal.

The urine contains bile, and the jaundiced condition of the body is due to the catarrh of the bile ducts obstructing the bile.

*Treatment.*—Whilst treating sheep and goats for this disease in previous seasons I found that when it was possible to treat the affected animals early in the disease the majority of cases will recover by giving a dose of calomel, 5 to 10 grains, according to the size and age, and separating them from the flock at once.

More often the disease has so far advanced that treatment is of little avail, and it is with such cases that the calomel treatment is found not to be successful and consequently condemned. I recommend that each shepherd should have a small bottle of calomel with him during the season the disease is prevalent, and as soon as he notices one of the flock shaking the head or the ears hanging, it should be caught, examined, and, if affected, given a dose dry on the tongue.

I have not found it necessary, if the sheep are dosed at once, to open the swellings about the head, as the medicine will affect their reduction.

In those cases which do not appear to recover as quickly as is desirable, I give doses of chloride of ammonia, 40 to 60 grains daily.

It is very essential to separate the sick from the flock at once, placing them in covered sheds to protect them from the sun, and allow them to remain quiet.

Where possible shift the affected flock to high veld and the disease will stop.

# Australia in the Old Days.

## A VOICE FROM THE PAST.

THE following is a copy of a letter written on the 4th February, 1822, at Sydney, New South Wales, which has been sent to the Department by a correspondent in whose possession the original is. The letter is interesting and instructive as illustrating the stage of agricultural development of Australia in that year.

Sydney,
4th February, 1822.

My dear Sir,—I have long promised myself the pleasure of writing to give you a sketch of the system of agriculture and grazing practised in this Colony, and I now take my pen with that intention, but I am apprehensive I shall be able to give you but a very imperfect account. My engagements since my arrival have been so many and important that I have not been able to acquire that minute knowledge of the subject I am sure you will expect from me; however, I shall endeavour to perform my promise to the best of my ability.

I shall begin with describing the different breeds of live stock. The horses are derived from the Cape breed, crossed with English of the coach, roadster, and hunter kinds; some Arabs and Persees from Bengal have also been introduced, and there are now some very good horses bred in the Colony, but they are capable of great improvement. The small English cart horse would perhaps be an acquisition, but a good breed might be obtained by a judicious and scientific selection from the present stock. The climate seems peculiarly favourable to horses, they are subject to few diseases, thrive well upon inferior food, and are able to endure great fatigue. The breeding of horses is a profitable branch of farming, but requires a large capital; really good brood mares are not to be had under £50 or £60 and some of our prime entire horses are worth £200 to £250.

The horned cattle are much better than might be expected; they originate principally from the Bengal and Surat breeds; those derived from the latter are strong bony animals and make excellent working oxen. Some English beasts of the Suffolk, Yorkshire, and Devon breeds have been imported and have much improved the original stock, and I can assure you some gentlemen now possess herds which would not disgrace the best grazing districts in England. Some animals of the Sussex breed would certainly be an acquisition; we also want a kindlier description for the pail. Good well-broke working oxen are worth £15 to £18. I purchased forty-five heifers, two years old, in calf, at £10 each ready money. This may seem a large price, but I had the picking of one of the largest and best herds in the Colony. I bought a three-year-old bull, about a month since, off Mr. McArthur, our great breeder, for which I paid him thirty guineas. Good milch cows that have been broke to the pail are worth £15. From these instances you will be able to form an idea of the present value of cattle; it is true that plenty can be bought for much less, but I flatter myself that mine are well selected and as choice a little herd as any

in the Colony. I calculate the profits of horned cattle where a person has sufficient capital to undertake the breeding of them properly at about £35 to £40 per cent. per annum upon the capital employed, clear of all expenses.

Sheep are most improved of any description of stock in the Colony. We have two kinds, the coarse woolled and the fine woolled; the latter are only the former kind improved by crossing with pure merinos. Of pure merinos there are not more than three hundred ewes in the country, the original number imported having been only four or five. Pure-bred merino rams are worth about £15, pure-bred ewes are not to be had at any price. Very highly improved cross-bred ewes may be had from 30s. to 45s. each, the coarse woolled ewes are generally about 20s. to 25s. each. The profits on sheep farming, where a person has a requisite capital and can attend to it himself, are probably higher than on cattle; but sheep require incessant attention and are very subject to the scab.

The breeds of swine are very excellent, being a mixture of the European and China kinds; they fatten readily to a large size and make very fine pork.

The usual method of enclosing land is by post and rail, which is brought to great perfection. The posts are set 2 feet in the ground and 5 feet high above ground, the rails are three, four, or five in number according to circumstances, they are morticed into the posts and being split very broad, a four-railed fence is complete against the escape of the smallest animal. Fences of this kind are usually set up at an expense of 2s. 6d. to 3s. per rod with two panels to a rod, and will probably stand fifty years, barring accidents.

The country at a short distance from the sea coast is what we term open forest land; that is, the trees stand at a good distance apart so that a cart or chaise may be driven in all directions, without underwood, and the ground is well covered with good nutritious grass. The enclosed farms are divided into large enclosures, termed paddocks, from fifty to three hundred acres, and in these the cattle are shifted. I do not think the quantity of large stock that can be kept upon ordinary forest land is more than one to every five or six acres while in a state of nature; some persons certainly keep much more, but on these over-stocked farms the cattle suffer very much, both in the heat of summer and cold of winter. The far greater part of the cattle are, however, kept in the uncultivated and unenclosed districts in the interior. Here people select a piece of land frequently of many thousand acres in extent, bounded by natural barriers of mountains, thick bush or rivers, and to these they send their bullocks and young cattle, keeping nothing but their breeding herd at home, and the cattle at these grazing stations are allowed perfect liberty, and only brought into a stockyard about once in every two or three months to be counted. In such places two men will look after several hundreds, and the profit upon them is very great. Sheep are also kept in the same manner, only that they are folded or brought into a yard every night; they are divided into flocks of about three hundred, each attended by a shepherd. Horses are almost always kept in paddocks.

Agriculture is scarcely followed by any one with a view to profit except the small settlers, men who have been soldiers or convicts; these get a grant of fifty to sixty acres of land, cut down a few trees, burn them off, break up the ground with large hoes, and put some in maize in October. In April this is ripe, and the same land is again hoed up

and sown with wheat, which is generally fit to reap in November. As soon as the wheat is off they plant the maize among the stubble and afterwards hoe up the latter at leisure; thus they go on taking two crops of grain year after year until the land is perfectly exhausted; they then clear a fresh piece and proceed as before. The greater part of these people live in bark huts surrounded by dirt and filth. As soon as their crop is ripe it is conveyed to market and converted into rum, tea, sugar, and tobacco, and while these last, or at any rate the first article, no further work is thought of. The better sort of people live much the same as people of the same class in England. Very few or indeed none of them are real farmers, but broken-down tradesmen, half-pay officers, etc., and consequently they affect more splendour than comfort in their style of living. Very little dairying or good housewifery are practised, our farmers' wives and daughters being too much the fine ladies to attend to such things.

Scarcely any kind of grain is cultivated, except wheat and maize; some little barley and rye, a few peas and beans are grown, but they are too inconsiderable to deserve mention. There are a few plantations of hops which thrive amazingly, but as yet our breweries are on a very small scale.

Fruit is very excellent and abundant, but very little cultivated with a view to profit, being principally used to feed swine.

I have thus, my dear sir, endeavoured to give you as concise an account as I could of our Colony, and although it is very imperfect yet I hope you will not deem the time you may expend in reading it as altogether thrown away. I have frequently lamented that such persons as yourself could not be induced to visit this Colony. Your ample capital and extensive knowledge could not fail of profitable employment and honourable reward, but the truth is real farmers are not immigrating people; they would sooner starve in their native village or country than ride in their carriage in another country. You would be surprised to see the description of people who come here to settle, shop-keepers and traders of all degrees. But I still hope the time is not far distant when I shall see some of the white frocks and grey coats of my native country come ashore.

# Protection from Hail.

READERS' CRITICISMS OF THE "PARAHAIL."

MR. LANGFORD'S note on parahails, in the June issue of the *Journal*, has brought us two letters criticising his statements and questioning the efficacy of the parahail. Mr. Langford has prepared notes in reply; and as our correspondents have evidently based their criticism upon M. Turpain's hostile report, which, as Mr. Langford says, has been frequently quoted by the opponents of the system, we think it will serve a good purpose if we publish the letters and replies in full.

I.

Mr. A. Kay Hards, Assistant Government Agriculturist at Cathcart writes:—In your recent issue of the *Agricultural Journal* I notice an article from Mr. B. C. R Langford, *re* protection from hail by the use of the "electric niagara." This is very misleading, as the attached article by Mr. A. Larforest, in the *Journal de la Societe Nationale d'Horticulture de France* (4th series, vol. xiii, Paris, Sept. 1912—reprinted in the "Publications of the International Agricultural Institute" by the Department of Agriculture, Canada, on 21st April, 1913, at Ottowa) shows.

The enclosure to the above letter is as follows:—"*Electric Niagaras in Recent Thunderstorms*.—The electric niagaras which have been in use for eleven years in the Department of Vienne are said by the inventors to have afforded complete protection from hailstorms during that period. This statement, contradicted by numerous inhabitants of these regions, was investigated by M. Turpain, of Poitiers, in 1911; he reported that the instruments were of little value, and in the same year a building in Poitiers which bore the apparatus was struck by lightning and set on fire. Notwithstanding this evidence, a powerful instrument was installed at the top of the Eiffel Tower, which was to afford protection to the whole of Paris; yet during this last summer, on five distinct occasions that city experienced heavy hail and thunderstorms, giving conclusive proof of the inefficiency of the electric niagaras."

II.

Mr. Langford replies:—I must demur to the statement of your correspondent, Mr. A. K. Hards, that my article was very misleading as I purposely confined myself to a bare statement of facts and refrained from expressing my own opinion.

I was well aware of M. Turpain's hostile report, which since it first appeared in 1911 has been frequently quoted by the opponents of the Electric Parahail System.

I can only account for its having done duty so often by supposing it to be the only adverse opinion advanced by any one of any scientific reputation,* I know of no one else who has made such sweeping assertions on so little evidence. I can assure your correspondent that it by no means disposes of the matter as he appears to believe.

Unfortunately, too. M. Turpain is wrong in his facts; the Hotel des Postes at Poitiers, as subsequent investigation showed, was not set on fire

* M. Turpain is a Professor of Physics at Poitiers,—B.C.R.L.

by lightning but by a "short circuit" due to the breaking of certain wires in the violent hurricane which preceded the actual thunderstorm.

The "niagara" on the neighbouring town hall exhibited luminous flames which showed that it was working, but was probably of insufficient capacity. There was no lightning stroke. "Earthing" conditions in Poitiers are particularly unfavourable.

Of the Eiffel Tower "niagara" a full account will be found in the report of M. L. Dausset, submitted to the municipal council of Paris in the present year. The report is so far encouraging that that body has decided to add to the installation if the results of 1913 confirm those of the past two years. I am not aware that it was ever claimed that the installation in its present stage would render the whole of Paris immune from hail and lightning. At present the protection afforded is partial but well defined and the area protected answers to the theory of the inventors.

From its great height (over 900 feet) the "niagara" at the top of the tower has no effect on storm clouds circulating at a lower altitude and later on supplementary posts will be erected at the Luxembourg, Pantheon, and Mont-Martre.

To argue that because complete protection is not afforded to the whole of Paris by this single post, parahails have been proved useless, is surely absurd. Moreover, the case of a vast city like Paris with its innumerable chimneys, factories, and engines giving off clouds of steam, etc., naturally differs considerably from that of an agricultural district.

The criticisms alluded to by your correspondent, and many others, have been ably dealt with by M. Tauzin, Inspector-General of Mines, in his report made for the Agricultural Group of the Senate assembled to consider the question.

Meanwhile the work goes on, existing lines are being strengthened where necessary, gaps are being filled and fresh lines planned. In Algeria a few posts are to be erected and 150 posts have been ordered for the Argentine, where the system has been studied for some time past. Canada also is making a start.

III.

Mr. W. P. G. Macpherson, Bloemfontein, writes:—Mr. B. C. R. Langford's article in your June issue on the "parahails" was most interesting reading, but, sad to relate, the inquiries made by the Government, or the Agricultural Department, on the spot (France) have been very discouraging to say the least of it; and, as so many people are interested in the matter, I am sure you will endeavour to publish the Agricultural Department's version in your next issue. It would be a pity if people in this country went to any further expense in the matter of erection of parahails for the want of a little information from the Department.

IV.

Mr. Langford replies:—If Mr. Macpherson is under the impression that the French Authorities have condemned electric "parahails" he is wrong. I believe I am correct in saying that, in reply to inquiries from the Union Department of Agriculture, the French Agricultural Department has declined to commit itself to a definite opinion one way or the other, on the ground that it only has statistics for about three years, which is not considered a long enough period. Meanwhile the French Parliament has quite recently voted a sum of money in aid, which would hardly be the case if parahails were an acknowledged failure.

# Irrigation in South Africa.

By F. C. Holland, Johannesburg.

[In connection with the announcement of the South African Irrigation Association in the *Union Agricultural Journal* for April (No. 4, Vol. V), the following contribution by Mr. F. C. Holland, of Johannesburg, is published. Other contributions have been received from A. T. Carbarns, of Witbank, Transvaal, A. E. Mills, of Dohne, Cape Province, J. B. Adams, of Parys, Orange Free State, and A. G. Long, of Prieska, Cape Province, which are receiving attention.

All interested in this important subject are again urged to forward contributions on any phase of irrigation farming and the uses of water for agricultural purposes, to the Secretary of the South African Irrigation Association (Mr. F. D. MacDermott), P.O. Weenen, Natal, in order to place on record some portion at least of the wealth of practical experience which has accumulated in this country. It has to be remembered that the association offers to pay up to five guineas per article when approved and accepted. Such contributions must not exceed 5000 words, approximately, and the association does not undertake to return rejected MSS. unless accompanied by stamped and directed cover.

There has been some necessary and unavoidable delay in getting this scheme into full work, but it is now hoped that at least one contribution will be published monthly in the *Agricultural Journal*.

At the next annual congress to be held some time in November, probably at Graaff-Reinet, the Irrigation Association will be asked to consider another scheme for the further encouragement of irrigators and irrigation. This will involve the awarding of a prize of £100 sterling for the best practical and commercial results to be obtained within a given period on a given area of irrigable land.]

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Although it is not intended in this article on irrigation to deal with the subject in such manner as to lay before its readers details relating to the exact methods upon which an irrigation scheme should be carried out, it is nevertheless hoped that what is set forth will enable a very great number of people both in South Africa and elsewhere to realize the overwhelming importance which will and must be attached in this country to the question of irrigation.

There can be little doubt that irrigation is destined to play a more important part in the future development of South Africa than any other economic factor.

Indeed, upon a right understanding and apprehension of what is involved in irrigation depends the whole future of South Africa as a civilized portion of the globe.

In order to gain a perfectly clear view of a landscape, to see the character and nature of the surrounding country, it is necessary to make an ascent from whence a good view can be obtained. In other words, a true perspective is essential, and so it is in all economic

factors concerning the well-being of South Africa. To gain a true perspective of South Africa one must in the first place go outside the country and endeavour to gauge the true relativeness of its position. To do this one must appreciate what is going on in the rest of the world.

Now, the most striking feature of the age is undoubtedly the effect a knowledge of hygiene or those conditions which tend to preserve and prolong life is doing for mankind. Hygiene is entirely modern. Not a hundred years ago little or nothing was known on the subject. Diseases of all kinds were treated as visitations of God, and it was almost impious to suppose that these visitations could be averted.

The historian of the last century will probably record as its most most important landmark in the progress of mankind the almost universal recognition of the fact that "God helps those who help themselves." A moment's reflection and one realizes what a complete reversal is herein involved of all that had gone before. No longer is disease sent from Heaven, but is mainly due to an ignorance and stupidity on the part of mankind capable of being prevented, and so it happens that the causes of disease more than the diseases themselves are, and have been for the last few generations, exercising men's thinking facilities, with the result that while little progress, comparatively speaking, has been made in the curing of the diseases enormous strides have been made towards the prevention of them, so that plagues and sicknesses which formerly carried people off wholesale no longer exist, and the population of the world is increasing at a rate unknown in the previous history of mankind.

Let us now consider what bearing these considerations have upon the subject of irrigation in South Africa. The topographical condition of South Africa is a matter which arrests attention and demands consideration. It is a high tableland or plateau with a rapid descent on all sides to the sea-level. Consequently all the waterways, streams, and rivers have a rapid descent from these high tablelands to the sea-level, and although on the highest point of the tableland (the Transvaal) the average annual rainfall is heavy—somewhere between 20 and 40 inches—yet it falls chiefly during a few months and then usually descends with great rapidity to the sea coast, resulting in a condition of more or less drought for the greater part of the year. As a consequence the soil is left in a baked and bad condition, and, worse still, subject to scorching heat and dry winds and duststorms, whereby much soil is carried away to the sea when the heavy rains fall. All this leads annually to an enormous wastage, erosion, and loss of soil. In fact the soil of South Africa is being wasted faster than it is being created, and in course of ages if nothing be done to arrest this wastage the whole of the tablelands of South Africa will ultimately become an arid wilderness, with here and there occasional patches of fertile soil in favoured valleys from which the soil cannot escape.

Now, this is a condition of things the ever-increasing and rapid population of the world will not (because it cannot afford to) tolerate. As has already been pointed out, a more accurate knowledge of the conditions pertaining to the well-being of physical life is tending rapidly to prolong and increase the life of man. Plagues which in olden times carried off annually thousands upon thousands of human beings no longer exist. Wars are less frequent, and so complex and

interwoven are the conditions of the various nationalities becoming that even these are likely to become of less frequent occurrence in the future. In short, everything is making for a rapid increase in the number and length of life of human beings, who will as a consequence be compelled to take measures to make every atom of soil capable of being fertilized minister to their wants.

There is probably no so large area of land so easily accessible or so capable of being made fertile as that geographically known as South Africa.

What there is needed to bring into immediate fertility and to prevent soil erosion and soil wastage of the plateau of South Africa is a system of water preservation, in other words "irrigation."

It is as certain as that night follows day and day night that sooner or later the many millions of acres untended, uncultivated, and going to waste in South Africa will be utilized for the support and maintenance of those who will be forced from want of space in European countries to move out from the more thickly populated countries. This will be brought about in so far as South Africa is concerned mainly by irrigation. All that is required to effect this is sufficient capital annually judiciously expended in damming up the water-ways leading from the plateau to the coast at stated intervals. By these means our rivers and streams which run dry for nine months in the year will become permanent flowing streams, underground springs will consequently arise on all sides, and irrigation—or the scientific application of stored waters to surrounding dry lands—will take place along every water-way leading from the plateau to the coast. Vegetation will quickly take place, an increased rainfall will follow, soil erosion will cease, and no longer will windstorms tear away surface lands.

Thus South Africa will become one of the most favoured portions of the globe. The richness and fertility of its soil is unquestioned. Its magnificent climate and abundant sunshine are probably unparalleled. All that is needed is a large influx of white people, bringing with them the hardy nature and sturdy character created by being born and brought up in the more northerly parts of the globe. And irrigation is a business demanding every one of these qualities to the exclusion—or at any rate secondary importance—of the native races, and thus it will be that the most vital and difficult of all South African problems, black *versus* white, will be solved. For it must be obvious that there can be only one real abiding solution to this question, and that is an increased white population, for were the whole of South Africa a Witwatersrand this problem would not be then solved. The only permanent vital population of a country is its agricultural population, or those engaged in scientifically wresting from the soil all its life-giving and life-preserving properties. The only real permanent source of wealth is that gained from the soil.

Irrigation, and irrigation alone, can redeem South Africa, the home of the happy idle native races, content to live a precarious existence, from becoming a barren wilderness. Irrigation must and will convert it into perhaps the most fertile and productive country in the world, bringing in its train a large industrious white population.

One thing is, however, immediately obvious from consideration of the foregoing, and that is that irrigation on such a scale as above indicated can only be carried out by the Government; and while this

is true, as is also the fact that neither the Government nor the people of South Africa are perhaps yet ripe for such a scheme as above, yet it would be a thousand pities if, as a corollary to this view, it should be imagined that the present-day farmer can individually do nothing pending the driving-power of the nation demanding the Government's attention to the necessity for and insisting upon a national scheme of irrigation. There is no farm on which something cannot be done either in a small or large way to preserve, retain, and utilize water, and so contribute towards a greater degree of irrigation general humidity and less wastage of soil. Let every farmer realize that almost every valley that he sees or has seen had its humble origin in bygone years in a small track or pathway formed by man, beast, or some operation of nature. Let each man on his own farm every year block tracks which have or may become water-ways and are eating, or will eat holes into, the soil and carry it down to the river and thence the sea. Let him plough deep, so deep that the rain when it does fall must sink into the soil. These are forms of irrigation open to, and capable of being practised by, every farmer throughout the country.

It is by an appreciation of such considerations as these that we must hope that the day is likely to be hastened when the Government of the country of whatever political colour will find itself forced by its people to conceive and grasp a bold comprehensive scheme of irrigation and create a stream so fertile as to convert our poor whites, whether of this or any other generation, into an industrious, happy, self-prosperous agricultural population. To ameliorate the condition of one generation of poor whites is like trying to cure an incurable disease. To understand that the existence of the poor whites is due to the causes which, if we will, we can control and prevent, is to take the first step towards eradicating the evil of the poor whites for the present and all future generations.

Finally, it may be urged that the above very broadly sketched idea of national irrigation is not practical because of the enormous capital expenditure involved. To those who would thus argue it would be well to remind of such schemes as the Suez and Panama Canal schemes, and to ask their contemplation of the fact that marvellous as have been, and are likely to be, the benefit to humanity and extraordinary advantages therefrom, it is doubtful whether they are comparable to the advantages to humanity, and South Africa in particular, which must ensue from a well considered and scientifically executed scheme of national irrigation; and, further, it may with safety be predicted for such a scheme there would be no difficulty in obtaining European capital. For it is to be remembered that there is one thing, and one thing only, which will induce the capitalist to look with favoured eyes upon South Africa as a field for investment, and that is a white population—so increasing and so bound to increase as to secure the ultimate predominance of white over black.

# Testing of Milk and Cream Samples.

THE testing of samples of milk and cream for butter-fat will be undertaken by the Department of Agriculture at the places mentioned hereunder.

Farmers desirous of having milk or cream tests made should—according to the locality of their farms—communicate with the following officers: —

*Cape Province (Western).*—Principal, School of Agriculture, Elsenburg, Mulder's Vlei.

*Cape Province (Eastern).*—Principal, School of Agriculture, Grootfontein, Middelburg, Cape.

*Transvaal.*—Principal, School of Agriculture, Potchefstroom, and Superintendent of Dairying, Pretoria.

*Natal.*—Principal, School of Agriculture, Cedara.

*Orange Free State.*—Pending the establishment of an Agricultural School in the Orange Free State, samples from farms south of Bloemfontein should be sent to the Principal, School of Agriculture, Grootfontein, Middelburg, Cape, and from farms north of Bloemfontein to Potchefstroom or Pretoria as stated above.

FEES.

The charge for testing is 6d. per sample of milk or cream, but if ten or more samples are forwarded by the same owner in one consignment a reduction of 25 per cent. on the charge will be made. Payment must be made when the samples are forwarded, either by postal order or by cheque. Postal or railage charges must be prepaid by the sender.

INSTRUCTIONS FOR TAKING SAMPLES.

*Milk (mixed).*—In taking a sample of mixed milk from a number of cows, the milk must be poured from one vessel to another several times, and the sample must be taken immediately before the milk is allowed to settle. If the sample is made up from mixed milk from several vessels, it should contain the quantity from each vessel which will ensure that the completed sample is an average of the whole bulk. The stirring of the milk is in each case not sufficient.

*One Cow.*—The cow must be stripped thoroughly, the milk strained and well mixed by pouring from one vessel to another several times, and the sample must be taken immediately after, before the milk is allowed to settle.

*Cream* samples should be prepared by stirring thoroughly and by pouring the cream from one vessel to another several times, and the sample must be taken immediately after.

(NOTE.—If it is desired to take composite samples of milk or cream application should be made for full information and instructions, which will then be given.)

*Bottles.*—The sample bottles should contain about $\frac{1}{4}$ pint of milk or cream. They must be thoroughly cleaned, and each sample must be labelled with the name of the owner; if it is taken from the mixed

milk of a herd it must be marked "mixed." In the case of samples of individual cows each sample must, in addition to giving the name of the owner, be marked with the name, number, or other identification mark of the particular cow. Particulars of the breed of the cow or herd must also be stated. If in the case of samples of mixed milk the animals are not all pure bred, the particulars should be given as "cross-bred" or "mixed breeding." Labels will be supplied on application. Care should be taken to have the bottles well corked and sealed before dispatch.

*Preservatives.*—To each sample bottle of milk should be added four to six drops of formalin (not more) and to each cream sample five grains of powered potassium bichromate, or just as much as can be carried on a threepenny piece.

In offering these facilities it is desired to place farmers in the position of being able to determine the butter-fat content of the milk of their herds and the percentage of butter-fat in the cream, to check the working of the separator by testing samples of the separated milk, and, lastly, to encourage the keeping of milk and butter-fat records. In the latter instance, samples should be submitted at regular intervals, either fortnightly or monthly. For any further particulars or information inquiries should be addressed to the Principals or Superintendent of Dairying, as indicated above.

The result of these tests may only be used by the owner of the samples for his private purposes, and must not be made use of in the case of any dispute or legal action between contracting parties.

ALEX. HOLM,
Under-Secretary for Agriculture.

# Rural Notes.

**Magistrates and the Veterinary Division.**

At the recent congress of the Veterinary Association, held in Pretoria, the following interesting paper on magisterial control and assistance to the Veterinary Division in dealing with proclaimed diseases was read by Mr. H. Rose-Innes:—As one who has for a period of over ten years and during three successive administrations been closely and intimately associated with the Veterinary Division of the Department of Agriculture in administering the Stock Diseases Regulations, I feel it a great honour to be invited to participate in your proceedings by submitting this little paper. I feel that I can look back upon the years that have flown with peculiar satisfaction, inasmuch as they marked strenuous and not unsuccessful endeavour and pleasant association with my scientific colleagues, resulting on the whole in a harvest of rich experience during the years that I have been privileged to collaborate with the Veterinary Division. I have learned to know and appreciate the peculiar difficulties under which the veterinary officers have had to work in eradicating and combating the spread of diseases amongst animals. I am only stating an axiom when I say that it is not possible to administer any law amongst a free people unless you do so with their consent. We know of laws, passed by the representatives of the people in Parliament, which have broken down in their administration owing to the fact that the law has been found unacceptable by the people for whose benefit it was enacted. This has happened more often than not owing to faulty methods being adopted for carrying out the law. The enforcement of the Act for the prevention of disease amongst stock and the regulations thereunder in many cases inflict hardship, and in nearly all cases inconvenience and expense. There is no branch of administration which calls for more tactful dealing with and judicious handling of the public than that which the Act and the regulations have called into being. In fact, it is not only submission to the terms of the law that you require; the co-operation of the public is also essential to successful effort. To get such submission and co-operation it is absolutely essential that our work should be based on sound administrative methods. There are two alternative methods on which the administration could be based. These it is my purpose to discuss later on.

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One of the great difficulties experienced in getting people to fall into line is a certain feeling of opposition to the veterinary faculty which is somewhat difficult to analyse. The most easy and direct conclusion to arrive at is that it is begotten by the demon of ignorance and prejudice. That this feeling is sometimes so begotten is undoubtedly true. On the whole I think it has its origin in the innate conservatism of the human combined with a sense of pride. When a farmer accumulates experience he grafts a proper pride on to that experience and is inclined to resent the intervention of the scientist in case the views of the latter do not coincide with his own. With this feeling it is often very difficult for the veterinary officer unbacked by other influences to secure the necessary sympathy and co-operation of the people he has to deal with. It is then that the assistance and

influence of the magistrate is so necessary. The two methods which could be adopted in administering the Act are by (*a*) placing the administration wholly and entirely in the hands of the veterinary officers, or (*b*) by interposing the assistance of the political head of the district. Parliament has adopted the second method, which is based upon the experience and legislation of the Transvaal before Union. The Transvaal system has stood the test of time and experience, has shown that any other system would undoubtedly have broken down. A large and important section of our farming population is still wedded to the old patriarchal idea of looking to one man for guidance in official matters, and that man is the official head of the district. It requires no effort of the imagination to conceive what would have happened, in the Transvaal at any rate, if a water-tight compartment system had been adopted and the administration placed exclusively in the hands of the veterinary officers. The magistrate would have been made the repository of all tales concerning the sins of omission and commission on the part of the veterinary staff. The magistrate, being essentially human, would in all probability lend a sympathetic and, under the circumstances, an ill-informed ear; the result being friction and undermining of the authority of the veterinary officers. The Legislature has, however, very wisely decided to make the work of dealing with proclaimed diseases a joint and mutual interest of the magistrate and the veterinary officer. The one has become the necessary complement of the other.

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Although the relationship between the magistrate and the veterinary officer is not clearly laid down under the Act, both being officers of the Veterinary Division, still practice has established the following position: the magistrate is consulted, and should be the guiding factor in all questions of method or policy; whilst he should again be guided by the professional and technical advice of the veterinary officer. This practice has always been pursued in my district, and during all the years I have worked with the Veterinary Division we have never struck any difference or point of friction worth mentioning. What has always kept things on an even keel is mutual knowledge and interest. Then the native is also a dominant factor in the situation. He requires to be dealt with entirely in the patriarchal way, and that through the chief official of the district, whom only he recognizes as the true channel of authority. When the field cornets were appointed in this district to deal with scab, the first thing they did was to ask the magistrate or native commissioner in conjunction with the sub-native commissioners to meet the natives throughout the district, lay down the law to them and enjoin obedience to the orders of the field cornets in regard to dipping and other orders. These field cornets were, as a rule, men highly experienced in dealing with natives, and, that being so, they felt that the interposition of the magistrate and the sub-commissioners was essential to successful work. The collaboration of the magistrate and the sheep inspectors has placed matters on a most successful footing. To-day the natives in the Pretoria District are a shining example. What I have endeavoured to impress upon you in the few words with which I have addressed you is how necessary and essential it is for success that the Veterinary Division and the district administration should work together in harmony, and that both should be inspired by the same interest and ambition. I, in

all my experience, have never struck more interesting work than that with which I have been entrusted by the Veterinary Division, and I wish, in conclusion, to express my high appreciation, and in this connection I feel that I am also voicing public sentiment, of the great work which the Veterinary Division has done in the Pretoria District.

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**Introduction of Stock into Rhodesia.**

The following notice has been issued by the Department of Agriculture, Salisbury, Rhodesia:—"With reference to Departmental Notice of 28th February, 1912, it is hereby notified that the said notice is cancelled, and importation of stock will now be permitted, in terms of Government Notice No. 110 of 1908, from the Province of the Cape of Good Hope, with the exception of the following districts: Komgha, East London, Peddie, Victoria East, Kingwilliamstown, Stutterheim, Cathcart, Stockenstroom, Queenstown (Gwatyn Ward only), Glen Grey, Maclear, Elliot, Slang River, Wodehouse, and Barkly East." The following is the form of declaration required in connection with the introduction of cattle into Southern Rhodesia: I, ......................................................, residing on the farm ......................................., in the district of .........................., do solemnly and sincerely declare that the .................... (number in writing) animals, also enumerated below, have been in my possession since birth and that lung-sickness (contagious pleuro-pneumonia) has not existed amongst any of my cattle nor on my farm during the last four years, and that no other bovine disease scheduled under the Diseases of Stock Act, 1911 (Union of South Africa) has existed amongst any of my cattle nor on my farm during the last twelve months, and that these animals have never been exposed for sale in any public market or stock fair.

Number of animals.................. Bulls............ Heifers............
Breed....................... Seller's name and address..........................
................................Purchaser's name.......................................
Place in Southern Rhodesia to which animals are being sent..............
.......................... And I make this solemn declaration conscientiously believing the same to be true..........................................

Declared to at...............................on this..........................
day of............................ before me,....................................,
Resident Magistrate for the District of...............................

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**A Shorthorn Dinner.**

We received too late for publication in our last issue a report on the "Shorthorn Dinner" held in Durban in July under the auspices of the Shorthorn Society of South Africa; and as this was the first function of its kind we should like to make some brief mention of it, even at this late stage. Mr. P. D. Simmons (the well-known Natal stock breeder, whose much-regretted death occurred towards the end of last month) was in the chair. Among those present were Sir David Bruce, Mr. F. B. Smith (Secretary for Agriculture), Mr. Alex. Holm (Under-Secretary for Agriculture), Mr. C. Groom, and Mr. E. W. Evans, together with practically all the leading Shorthorn breeders of Natal, besides several representatives from the other Provinces. Mr. Smith proposed the toast of the evening, "The Shorthorns." In the course of his remarks he said the Shorthorn was the first breed of cattle in England, next to the Longhorns, on

which improvement had been early manifested, and he thought that the general improvement in all breeds in England was due to the example set by the Shorthorn breeders. The Shorthorn had been in England almost a Royal breed. All our kings had always kept Shorthorns at Windsor, and exhibited them with those of their subjects. The breed had received many signal favours at the hands of Royalty. The Shorthorns should be interesting also to the Dutch section of the community, inasmuch as it had at its foundation a considerable admixture of the cattle from the Low Countries, and for that very reason it appeared to him that it ought to be a particularly good breed for South Africa. He felt sure that this dinner would make for the good of the breed. It brought breeders together, and the interchange of ideas was bound to promote its welfare. Much as we admired and sought good lineage *we wanted good animals in themselves,* and he thought breeders were now establishing their herds on some solid foundation. The Shorthorn was now on a firm basis, and this would grow more and more. He had no idea that there were so many men interested in the breeding of Shorthorns in South Africa, and it was a source of deep gratification to him to see so many breeders importing tip-top animals. Might he impress upon them the necessity of taking the greatest care of them? He would, however, remind them that many good animals had been brought into this country and been neglected. He thought that we had now passed that stage. The animals had been put on the show in good style. It gave him great pleasure to see good animals, but it gave him greater pleasure to see them put on the show in good order, because it meant that the cattle were appreciated and looked after, and that was what we wanted The inexhaustible supply of good Shorthorns that had gone to the United States of America was an astounding fact. Some breeders over there had come together and were having a dinner—just as we were doing—where they praised the merits of the Shorthorn cattle they had recently imported. He remembered a celebrated American orator saying that all the good Shorthorns came from England, and that all that stock they had had come from a "little mud bank that would not give a dog a square meal," and this stock was going to all parts of the world! The majority of Shorthorns were first class, and he would like to say what gratification it was to him to be honoured by proposing this toast. He could assure them that if he could assist the movement in any way he would be only too glad to do so. He would now propose the health of the Shorthorn, the king of cattle, the red, white, and roan.

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In the course of the discussion which ensued, Mr. Simmons said it was a satisfaction to know that the Shorthorns in competing against all breeds had always carried off the large trophies, and this had occurred this year in Estcourt, when it had fallen to a nine-months-old calf in open competition with all breeds. He wanted to see the Shorthorn win the milking prize in any company. The main feature of this year's shows was that the Colonial animal was coming first, leaving the imported animals often behind, and this was a great encouragement to breed good animals in the country. Mr. Holm said they had to face a much keener competition now than in the past, and so far as his experience went the Shorthorn was not suited to all parts of the Union; he thought they would be wise in encouraging the breed of Shorthorns in those portions that were suitable for

the breed, and let the rest of the country go by. If they pressed the breed in districts unsuited they would do the breed more harm if it was not a success than by leaving it alone. He advocated the Shorthorn for every and all good parts of the Union. Mr. Pepworth observed that the heavy hair of the Shorthorn afforded greater protection to the tick, but since dipping had been started it had been proved that the Shorthorn was the best animal for the country for dairying. Mr. Gilson remarked that an important adjunct to cattle breeding was good pastures. He had tried every grass under the sun, and he found that cocksfoot grass was not to be beaten. At the end of June on cocksfoot his cattle were doing as well as in February on ordinary veld. The discussion generally proved a most profitable one to Shorthorn breeders, and the Society is to be complimented upon what must prove to be a useful innovation.

**Land for Disposal.**

Applications will be received by the Secretary for Lands, c/o the Surveyor-General, Pietermaritzburg, Natal, for a period of ten weeks from the date of the first publication of this notice (12th August) and for such time thereafter as the holdings or any of them remain unallotted, for the farms enumerated in the accompanying list, to be disposed of on lease for a period of five (5) years, with the option of acquiring the land at any time during the currency of the lease, or at the expiration thereof, on terms of Conditional Purchase Lease extending over a period of twenty (20) years, under and subject to the provisions of the Land Settlement Act, No. 12 of 1912, and any regulations published thereunder. The title to be issued will contain conditions relative to residence, improvements, fencing, and such other conditions as are usually inserted in agricultural leases granted under the Land Settlement Act, No. 12 of 1912. Should any of the above holdings be allotted to a partnership, it will be a condition of allotment and of the lease that all the partners must reside on the land for a period of at least eight months in each year. The rent paid during the lease period of five years is not deducted from the purchase price in the event of the option to purchase being exercised. All rights to minerals, mineral products, mineral oils, metals, and precious stones are reserved to the Crown. No applications for the holdings mentioned above will be considered until after the expiration of ten weeks from the date of this notice, and applicants are recommended personally to inspect farms before formally applying therefor. Occupation can be granted immediately on allotment. All applications must be submitted on the prescribed forms. Forms of application and copies of the regulations framed under the Act, in which appears a specimen copy of the lease to be issued, can be obtained from the magistrates of the districts in which the farms are situate, the Secretary for Lands, Pretoria, or the Surveyor-General, Pietermaritzburg.

Applications are also invited for certain lands in the Bloemhof, Pretoria, Rustenburg, Potchefstroom, and Zoutpansberg Districts of the Transvaal (see accompanying table). The Lands Department make the following observations with regard to these holdings:—(1, 2, 3, 4) The holdings are well suited for cattle, are well wooded, and healthy. There is a borehole on each of the holdings giving estimated daily water supplies of (1) 3600 gallons; (2) 3000 gallons;

(3) 48,000 gallons; (4) 15,600 gallons. (5) Suitable for agricultural and stock farming; no permanent surface water; slightly malarious in summer; native labour scarce. There is a small house on the holding and two dams which hold water during certain seasons of the year. Good stock farm. An amount of £56. 10s. has been added to the valuation of the farm in respect of the cost of fencing a portion thereof. (6) Stock farm; well wooded; no permanent surface water; slightly malarious in summer; natives living in the vicinity. (7) Suitable for agricultural and stock farming; sufficient water for stock and domestic purposes in a well and spruit; healthy; native labour scarce. There are improvements on the holding which consist of a small dwelling-house; rondavel; a well about 40 feet deep; and a number of fruit trees.

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(8) Suitable for agricultural and stock farming; no timber; healthy; good supply of water in the Mooi River, which forms the western boundary of the farm. Should the late lessee of the holding be an unsuccessful applicant for the farm, the improvements, which consist of a four-roomed house, about 1000 yards of drains, some fruit trees, and several morgen of land under lucerne, valued in all at approximately £130, must be taken over and paid for in cash at a valuation to be fixed by the Minister of Lands. In the event of the person who, until recently, leased $1\frac{1}{4}$ morgen of the farm as a store site being unsuccesssful in his application for the holding, it will be a condition of allotment that the successsful applicant must allow him one month from the date of the allotment of the holding in which to remove any buildings or improvements which were erected by the said lessee on the portion leased as a store site. The holding is subject to a deed of servitude, whereby the owner of a certain undivided half-share in the remaining extent of the farm Buffelsvlei No. 87, District Potchefstroom, was granted the right to take out a water-furrow on the holding advertised, for a period of ninety-nine years from 21st March, 1898. There is a further servitude whereby the Government has the right of water for irrigation in respect of its ground between the farm Buffelsvlei and the dam, and in return is responsible for the maintenance and construction of a bridge across the water-furrow, but will be free in respect of the maintenance of the portion of the furrow crossing the Government ground and the dam. (9) Suitable for agricultural and stock farming; well wooded; healthy; natives living in the vicinity. There is a good spring on the holding supposed to be permanent. Some improvements, consisting of a house, some fruit trees, and a small wood and iron shed, are on the farm. (10) Suitable for agricultural and stock farming; sparsely covered with thorn bush; considered healthy; natives living in the vicinity. Good cattle farm. There is a borehole on the holding giving an estimated daily water supply of 20,400 gallons. (11) Fairly well wooded; the Ts' Juenis River, which forms one of the boundaries of the farm, contains sufficient water for stock and domestic purposes; there is also a spring on the farm; fairly healthy; natives living in the vicinity; there are two dwelling-houses on the property—one of no value; a small dam; about eighty orange trees and a few walnut and peach trees. The lease will be subject to a servitude in favour of Lot A of the farm relating to a certain business site with trading and grazing rights. A copy of the servitude may be obtained on application to the Department of Lands, Pretoria.

# LANDS FOR DISPOSAL.

| Holding Number. | Registered Name and Number. | Area. Morgen. | Area. Sq. Roods. | Purchase Price. | Rental during lease period of 5 years. 1st Year, nil. 2nd and 3rd years, 2 per cent. per annum. Half-yearly Rental. | Rental during lease period of 5 years. 1st Year, nil. 4th and 5th years, 3½ per cent. per annum. Half-yearly Rental. | If option of conditional purchase be exercised—Half-yearly Instalment, which includes Capital and Interest at 4 per cent. spread over 20 years. | Approximate area of. Pastoral Land. | Approximate area of. Arable Land. | Nearest Railway Station. | Miles. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **BLOEMHOF.** | | | | | | | | | | |
| | | | | £ s. d. | £ s. d. | £ s. d. | £ s. d. | | | | |
| 1 | Northern portion of the farm Ongerust, No. 300 | 1059 | 209 | 1079 8 0 | 10 15 11 | 18 17 10 | 39 9 2 | 1059 | | Bloemhof | 30 |
| 2 | Southern portion of the farm Ongerust, No. 300 | 1059 | 213 | 1079 8 0 | 10 15 11 | 18 17 10 | 39 9 2 | 1059 | | " | 30 |
| 3 | Northern portion of the farm Uitkyk No. 299 | 1005 | 591 | 1277 11 0 | 12 15 6 | 22 7 2 | 46 14 4 | 1005 | | " | 30 |
| 4 | Southern portion of the farm Uitkyk No. 299 | 1005 | 592 | 1277 11 0 | 12 15 6 | 22 7 2 | 46 14 4 | 1005 | | " | 30 |
| | **PRETORIA.** | | | | | | | | | | |
| 5 | Kromkuil No. 122, portion ... ... | 1349 | 542 | 1406 9 0 | 14 1 3 | 24 12 4 | 51 8 3 | 1000 | 349 | Hammanskraal | 15 |
| 6 | Ennis (G.G.) No. 352 ... ... ... | 919 | 360 | 707 10 0 | 7 1 6 | 12 7 8 | 25 17 3 | 919 | Patches. | Brits | 10 |
| | **RUSTENBURG.** | | | | | | | | | | |
| 7 | Portion marked No. III of the farm Kortfontein No. 428, and remaining extent of portion of the farm Olyvenfontein No. 587 | 254 | 367 | 282 13 0 | 2 16 6 | 4 19 0 | 10 6 8 | 214 | 40 | Koster | 8 |
| | **POTCHEFSTROOM.** | | | | | | | | | | |
| 8 | Portion of the farm Gerhardminnebron No. 328 | 200 | — | 582 16 0 | 5 16 7 | 10 4 0 | 21 6 1 | 130 | 63 [7] | Frederikstad | 2 |
| | **ZOUTPANSBERG.** | | | | | | | | | | |
| 9 | Sterkstroom No. 2507 ... ... ... | 95 | 444 | 85 4 0 | 0 17 0 | 1 9 10 | 3 2 3 | 70 | 20 [5] | Louis Trichardt | 10 |
| 10 | Wyllie No. 2009 ... ... ... ... | 819 | 386 | 526 19 0 | 5 5 5 | 9 4 6 | 19 5 3 | 819 | | " " | 13 |
| 11 | Ts'Juenispoort West No. 599 (remaining extent) | 661 | 133 | 359 8 0 | 3 11 11 | 6 5 10 | 13 2 9 | 599 | 60 [2] | Pietersburg | 27 |

[ ] = Irrigable land.

## LANDS FOR DISPOSAL.

| Holding Number. | Registered Name. | Area. Acres. | Area. Roods. | Area. Perches. | Purchase Price. | Rental during lease period of 5 years. 1st year, nil. 2nd and 3rd years, 2 per cent. per annum. Half-yearly Rental. | Rental during lease period of 5 years. 1st year, nil. 4th and 5th years, 3½ per cent. per annum. Half-yearly Rental. | If option of conditional purchase be exercised—Half-yearly Instalment, which include Capital and Interest at 4 per cent. spread over 20 years. | Character of Land. | Nearest Railway Station. | Miles. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **KLIP RIVER DIVISION, NATAL.** | | | | | | | | | | |
| | | | | | £ s. d. | £ s. d. | £ s. d. | £ s. d. | | | |
| 1 | Lot "A," Roode Poort... ... | 1734 | 3 | 33 | 2851 5 9 | 28 10 3 | 49 18 0 | 104 4 7 | Arable & pastoral | Ladysmith | 6 |
| 2 | Lot "B," „ ... ... | 820 | 0 | 31 | 1392 6 8 | 13 18 6 | 24 7 3 | 50 18 0 | „ | „ (approx.) | 6 |
| 3 | Lot "C," „ ... ... | 1183 | 3 | 12 | 1864 4 7 | 18 12 10 | 32 12 6 | 68 3 0 | „ | „ „ | 6 |
| 4 | Lot "D," „ ... ... | 1002 | 1 | 27 | 1748 12 2 | 17 9 9 | 30 12 0 | 63 18 5 | „ | „ „ | 6 |
| 5 | Lot "E," ... ... | 1334 | 2 | 1 | 2335 12 5 | 23 7 1 | 40 17 6 | 85 7 7 | „ | „ „ | 6 |
| 6 | Lot "F," „ ... ... | 1296 | 1 | 14 | 2138 12 2 | 21 7 9 | 37 8 6 | 78 3 7 | „ | „ „ | 6 |
| 7 | Lot "G," „ ... ... | 1102 | 2 | 37 | 1869 12 3 | 18 13 11 | 32 14 4 | 68 6 11 | „ | „ „ | 6 |
| 8 | Lot "H," „ ... ... | 1157 | 2 | 9 | 1966 8 3 | 19 13 3 | 34 8 3 | 71 17 8 | „ | „ „ | 6 |
| 9 | Lot "J," „ ... ... | 1087 | 2 | 0 | 1805 11 4 | 18 1 3 | 31 12 0 | 66 0 1 | „ | „ „ | 6 |
| | **DIVISION OF UMLAZI.—NORTH BARROW LOTS.** | | | | | | | | | | |
| 10 | Lot No. 1, North Barrow ... | 135 | 0 | 7 | 691 6 11 | 6 18 3 | 12 1 11 | 25 5 6 | Arable & pastoral | South Barrow | 1 |
| 11 | Lot No. 2, „ ... | 132 | 3 | 18 | 813 6 9 | 8 2 8 | 14 4 8 | 29 14 8 | „ | „ | 1 |
| 12 | Lot No. 3, „ ... | 138 | 1 | 13 | 781 5 5 | 7 16 3 | 13 13 5 | 28 11 3 | „ | „ | 1 |
| 13 | Lot No. 4, „ ... | 121 | 2 | 8 | 874 6 0 | 8 14 10 | 15 6 0 | 31 19 3 | „ | „ | 1 |
| 14 | Lot No. 5, „ ... | 117 | 1 | 38 | 841 1 3 | 8 8 3 | 14 14 5 | 30 14 11 | „ | „ | 1 |
| 15 | Lot No. 6, „ ... | 133 | 0 | 4 | 948 16 6 | 9 9 9 | 16 12 1 | 34 13 8 | „ | „ | 1 |

**Farm Pupils.**

It will be remembered that some months ago we intimated that the South African National Union had initiated a movement for the purpose of placing young men on the land of this country. The scheme is not confined to men from oversea, but embraces the South African born youth as well, the object being to make an attempt to remove as far as possible the existing disparity in the numbers of our white and black population, a condition of things which every right thinking person views with alarm. It is not necessary to consider our urban populations—the lure of the towns will always meet any need in that direction. What is required is a steady flow of men to the land, for apart from the important consideration already referred to, our agricultural output must be largely increased before we can supply even the needs of our own markets. Although the South African National Union believes that an immigration policy would be in the interests of the South African nation it does not propose to enter upon such a scheme, because it is considered that such work belongs to Government rather than to private enterprise. But it is felt that a beginning in this direction can be made by introducing such small numbers of educated young Europeans, not necessarily English, as it may be possible to obtain, and by helping South African lads also to get on to the land. It is recommended that those young men stay two years on a farm, then go through a course of instruction at one of the agricultural colleges here, followed by a further period of practical training. By this time they should be qualified to start on their own, or to take up ground or stock on shares with some farmer. There is evidence that there would be little difficulty in obtaining the last form of assistance. The South African National Union has a large number of applications for pupils from farmers in different parts of the Union. It now asks for the names of young men who are willing to fill these vacancies. A special appeal is made to parents to assist their sons to take up farming, which as a means of livelihood, offers far greater attraction than any other form of employment.

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**Locust Destruction.**

Owing to the expectation that voetgangers of the brown locust will soon appear in the northern part of the Cradock District and southern part of the Middelburg District of the Cape Province, the notice of farmers and others is directed to the following provisions in sections *sixteen* to *nineteen* of the Agricultural Pests Act, 1911, viz.: (1) Whenever locusts deposit their eggs or voetgangers appear on any land, the occupier thereof shall, as soon as the fact is brought to his knowledge, with reasonable speed *give notice thereof* in writing to the nearest magistrate or field cornet, or at the nearest police post or police station. (2) Every occupier of land on which voetgangers appear shall cause the voetgangers to be *immediately destroyed* in consultation with and on the advice of the Department of Agriculture, and the material for such destruction shall be provided free of charge by the Department. (3) Any occupier of land shall ordinarily be guilty of an offence against the Act if he causes or permits the driving of voetgangers from his land on to the land of his neighbour. Occupiers of land are hereby directed to give notice of the laying of locust eggs or the hatching of voetgangers, and to destroy voetgangers, as required by the Act.

The Department of Agriculture advises that a sweetened solution of arsenite of soda be used for the destruction of voetgangers. Supplies of such a solution, in concentrated condition in drums of 1½ gallons, will be lodged with magistrates in districts where locusts are reported, and on application will be issued free of charge to occupiers who notify the presence of eggs or voetgangers on their land. An effort will be made to have supplies also procurable from police posts. In general not more than two drums of the poison will be issued to any one occupier at one time. Pumps to facilitate spraying for the destruction of voetgangers will be issued by magistrates on loan. A deposit of 15s. apiece may be required, and the issue of more than one for use on any one farm may be declined. No objection will be taken to the destruction of voetgangers by any means which the occupier concerned may care to employ if that means is speedily effective for the entire destruction of the swarm or swarms, but the Government will supply only the above-mentioned solution of arsenite of soda, and will not contribute to the cost of purchasing any material.

**The Sheep-Dip Controversy.**

Mr. T. H. Moore, a member of the well-known firm of Moore Bros., Huddersfield, England, writes as follows to the Editor of the *Farmers' Weekly*:—"It is very refreshing to notice the prevailing note of sound common sense which runs through most of the letters you have published with reference to the dip question. The farmer's first interest is to get rid of scab, and he is prepared to take what some consider a risk on minor points if only he can get his flock clean and proof against further contagion. He believes in that dip which will most effectively kill the scab, and he is right so long as he uses it before the wool is more than three or four months grown. He knows that any dip which will injure his wool eight or nine months later will also injure his sheep long before that time, and he is too sensible a farmer to take that risk. In sending an expert to this country to investigate on the spot the objections raised against the popular dip, the Government have taken a wise step which should settle the question once and for all. In selecting Mr. Mallison for the mission, General Botha has shown how keenly he appreciates the importance to the farmers of having an opinion which will be founded on a thorough knowledge of every consideration affected. It is of the highest importance that the expert selected should be not only a sheep man and a wool man, but also well versed in the various processes of manufacture, and, above all, of a calm, judicial mind which will not be led away by claptrap and 'highfalutin' nonsense about what may happen, but will want to see and know what has happened and what is happening. I have known Mr. Mallison's family for forty years as amongst the foremost woollen manufacturers in Yorkshire, and at my first interview with him I soon realized that he inherited the family faculty of sifting matters to the bottom. The way he questioned me about the many experiments and tests I made before finally recommending in 1907 to the Orange River Colony Government to adopt the soda and sulphur dip, satisfied me that if in the end I was proved to be wrong I at all events was not to be condemned, as the Bradford Chamber of Commerce had condemned me, without a hearing or without any

attempt to go further than the expression of the same pious opinion and the same doubts and fears about soda which I expressed myself when questioned in South Africa in 1905, before I had examined sheep which had been dipped, some in each month of the year, at Grootvlei Government Farm, and before I further experimented at home.

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"It may not be amiss to remind your readers, what I have pointed out before, that the strongly worded recommendations of the Bradford Chamber of Commerce wants taking with the proverbial pinch of salt. These resolutions were raised in 1908 at a meeting to which all those connected with the trade in Bradford, no matter how remotely—merchants, buyers, combers, scourers, and dyers, numbering probably many hundreds—were invited. But such was the state of agitation which existed in the minds of the trade over this burning question that how many atending the meeting? Exactly six, twice the number of the famous tailors who assembled in Tooley Street on an equally important occasion. And not one of them was a buyer of Cape wool! When I first learned of the meeting by the report in the paper next day I promptly interviewed the leading buyers in Bradford, and asked why they had not attended. In each case I got the same answer—they had no fault to find and had never had a complaint which they could trace to any fault in the wool. The newspaper expert who moved the condemnatory resolutions was the same who, shortly before, had reported upon some fleeces sent him by the Cape Government, and found traces of soda deposit on fleeces which had never been near the soda dip (see Cape Government Agricultural Report for 1907 or 1908). As this gentleman is the same who is now stirring up the question again in his paper, the *Wool Record*, and in the columns of *The Farmers' Weekly*, you would assist your readers to place a proper estimate upon the value of his opinion by reproducing his report on the fleeces above referred to.

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"To say that the use of soda and sulphur is responsible for the lower prices of Cape wool is sheer nonsense. I have yet to learn that lower prices are or have been paid for Cape wool than for similar wool from either Australia or South America. Wool is bought on its clean value, and when one hears of such low yields as 22 per cent., which a French buyer informed me was all he got out of a blend of 1000 bales Cape wool this year, you cannot wonder at low prices being paid for such wool. There is a disposition in some quarters to compare the 8d. paid for South African 32 per cent. yield with the 1s. paid for Australian 48 per cent. of similar quality, and then cast about to find any reason except the true one, the difference in condition. Taking that into account the price paid is the same:—

32 per cent. at 8d., 25d. clean.
48 per cent. at 12d., 25d. clean.

I know that some progressive farmers in the Free State are to-day netting a return per sheep equal to the average Australia, although the price per pound is less. You cannot alter your climate. You cannot get rid of dust storms, but you may minimize their effects by getting your paddocks more closely grassed. This can be done by avoiding over-stocking and not allowing natives to drive the sheep either to kraals or elsewhere in such a manner as to raise a dust. You may go

on selecting your studs with a view to more length and density of fleece without, however, adopting the wrinkles, for the Vermont craze is exploded. You can get rid of scab, and my advice is, until you have Mr. Mallison's report to guide you, to go on using the dip which experience has taught you is most effective for this purpose. So long as it is used before the wool is four months grown you need not fear having to take any less money for your wool in consequence."

**Export of Eggs.**

The Industries Section of the Department of Customs and Excise has received from the Trades Commissioner a sample egg case, which has been furnished by Mr. Gundle, of 21 Lime Street, London, E.C. The case is similar to those used for the export of Irish eggs, and the cost landed at Capetown is estimated at from 2s. 3d. to 2s. 6d. per case, with fittings. Any one interested in the export of eggs from South Africa can inspect the egg case above referred to on application to the Commissioner of Customs and Excise, Pretoria. In this connection it may be mentioned that the Union-Castle Company has now decided to carry shipments of eggs coming forward from the various South African ports up to the end of the present year at the reduced rate of 25s. per ton measurement. Mr. Chiappini recommends South African farmers to ship trial consignments by about the middle of October, so that the produce could be on the London market early in November. If intending shippers will advise the Trades Commissioner of dispatch of consignments, the sales will be watched and fully reported upon.

**Books for Farmers.**

Many requests are received by the Department from farmers for advice as to suitable works to study on the various activities with which they are concerned. We have therefore decided to publish from time to time lists of works likely to be of assistance to the farmer who desires to improve his knowledge of the principles, and of so much of the practice as books can be expected to convey, of farming, and we begin this month with a list of general works, furnished by the Librarian. This will be followed by lists referring to special branches of farming, In each case the publisher's name and the price of the book is given; and all these books may be obtained from or through any of the leading South African booksellers. The list is as follows :—"Principles of Agriculture," by L. H. Bailey (Macmillan & Co., New York : 5s.); "Handbook of Agriculture, with special reference to requirements of South Africa," by Professor F. Blersch (J. C. Juta & Co., Capetown : 7s. 6d.); "The Agricultural Valuer's Assistant : A Practical Handbook on the Valuation of Landed Estates," by Tom Bright (Crosby Lockwood & Son, London : 6s.); "Droge-Land Boerderij," by Henrich du Toit (Het Western Drukkerij, Potchefstroom : 3s.); "Dry-Farming : Its Principles and Practice," by Wm. Macdonald (The Century Co., New York : 5s.); "Dry Farming : A System of Agriculture for Countries under a low Rainfall," by John A. Widtsoe (Macmillan & Co., New York : 6s. 6d.); "Elements of Agriculture : A Textbook," by W. Fream : revised by Professor Ainsworth-Davis (John Murray, London : 5s.); "How to Choose a Farm," by Thomas F. Hunt (Macmillan & Co., New York : 7s. 6d.); "The Agricultural Notebook : Notebook of Agricultural Facts and Figures for Farmers and Farm Students," by P. McConnell (Crosby Lockwood & Son, London : 5s.); "Hints to South

African Farmers," by J. G. McDonald (Argus P. & P. Co., Johannesburg: 2s. 6d.); "Small-Holders: What they must do to Succeed," by Edwin A. Pratt (P. S. King & Son, London: 2s.); "The Fertility of the Land," by Isaac P. Roberts (Macmillan & Co., New York: 5s. 6d.); "The Farmer's Business Handbook," by Isaac P. Roberts (Macmillan & Co., New York: 4s. 6d.); "The Farmstead," by Isaac P. Roberts (Macmillan & Co., New York: 5s. 6d.); "Agriculture," by F. H. Storer, 3 vols. (Chas. Scribner's Sons, New York: £1. 10s.); "The Books of the Farm," by Stephens (Wm. Blackwood & Sons, London: £3. 3s.); "Farming Industries of the Cape Colony," by Robert Wallace (P. S King & Son, London: £1); "Co-operation in Agriculture," by H. W. Wolff (P. S. King & Son, London: 7s. 6d.).

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**Agricultural School Magazines.**

It is interesting to note that the students of the Potchefstroom and Grootfontein Schools of Agriculture have decided to follow in the footsteps of older institutions in other parts of the world and bring out school magazines. We have before us copies of *The Transagric* (from Potchefstroom) and the *Magazine of the Grootfontein School of Agriculture.* The former is to be published quarterly and the latter half-yearly. Of the two, *The Transagric*, although less pretentious, conforms more to the accepted type of the school magazine. There is, however, a difference in aim: *The Transagric* is published for the students and for them only; it is to constitute a record of the doings of present students, and to enable past students to keep in touch with their *alma mater*. The Middelburg publication, on the other hand, has not only these for its objects, but it is intended also "to present in popular manner information dealing with agricultural and kindred subjects, and to embody from time to time the results of any investigational or experimental work carried on at the institution." The idea is to keep in close touch with the farmers, particularly of the eastern and midland districts of the Cape Province, whose support the promoters of the magazine requisition. Both these journals contain a large amount of school news, and they should receive the support necessary for their prosperity. They have a useful part to play in the life of their respective institutions, and we wish them every success.

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**Notes from the Schools of Agriculture.**

Mr. C. J. Starke has been appointed Farm Manager of the Elsenburg Experiment Farm and School of Agriculture.

Messrs. A. O. D. Mogg, of Pretoria, and H. Landau, son of Mr. C. Landau, a former mayor of Standerton, have lately distinguished themselves at Cambridge. These men were originally students at Potchefstroom Experiment Farm, and later proceeded abroad to continue their studies at Cambridge University. Mr. Landau has proved himself an exceptionally brilliant scholar, and has been credited with first class honours in the science tripos part I, chemistry being his major subject; and Mogg received third class honours in the science honours in the science tripos part I, with botany as his special subject.

The shipment of Friesland cattle referred to in the May number of the *Journal* has now arrived. Thirty-five cows and heifers and two bulls have been imported for Government farms. The selection of the animals was left in the capable hands of Mr. J. Enschede and Professor Wibbens; and included in the consignment are a number of animals of a high standard of merit. The shipment was attended with remarkably good results.

No loss of any kind took place on board ; and no less than ten calves were born on board or shortly after their arrival, but unfortunately one animal reacted to the tuberculin test. These cattle have been distributed as follows :—One bull, 23 cows, and 10 calves to Grootfontein School of Agriculture ; 9 cows to the Potchefstroom School of Agriculture ; 1 bull to the Government Farm at Ermelo ; and 2 heifers to the Government Veterinary Laboratory at Onderstepoort, Pretoria, for experimental purposes.

Much to the regret of the Department and his colleages, Mr. William Moore, B.A. of Cornell University, has resigned his appointment as Lecturer in Entomology and Zoology at the Potchefstroom School of Agriculture, and returns to the United States. During the three years that he has been in South Africa Mr. Moore has done much good work. In addition to his duties as a member of the educational staff at Potchefstroom, he has conducted a great deal of research work in entomology, and has

E. Harrison (*Cedara*). Dr. A. I. Perold (*Elsenburg*). M. Joubert (*Glen*).

*Plate No. XLV.*

E. J. Macmillan (*Potchefstroom*). Alex. Holm (*Under-Secretary for Agricultural Education*). R. W. Thornton (*Grootfontein*).

FIRST CONFERENCE OF PRINCIPALS OF AGRICULTURAL SCHOOLS.

done much to advance our knowledge of the insect pests of South Africa; whilst to him is due the honour of discovering the existence of San José scale in this country. Mr. Moore has been a frequent contributor to the *Journal*, and has published a notable book on "South African Insects and other External Pests of Man and Domesticated Animals." The best wishes of the Department for his success in the future go with Mr. Moore in his entry into a fresh sphere of activity.

An important development in connection with agricultural education in South Africa was marked by the holding of the first conference of Principals of Agricultural Schools, which took place in Pretoria on the 9th June, under the chairmanship of Mr. Alex. Holm, the Under-Secretary

for Agricultural Education. The conference lasted four days, and many important subjects were discussed, including the prospectus to be issued for each school; rules and regulations governing admission to the school and the control and discipline of students; syllabus of instruction and subjects to be taught for the award of diplomas and certificates, scholarships, and bursaries (for study abroad, merit bursaries, etc.) and the conditions pertaining to each; the holding of short vacation courses of instruction at the schools; inter-schools stock-judging competitions; conduct of research, experimental, and investigational work generally; together with many other matters pertaining to the management of the schools and experiment stations. In this way uniformity in the aims and purposes of the schools will be achieved. Further particulars of the results of the conference will appear in due course, after the matter has received the consideration of the Minister of Agriculture.

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**Miscellaneous Notes.**

Regulations framed under the Excise and Customs Tariff Amendment Act, 1913, appear in the *Union Gazette* of the 22nd July. These regulations deal, *inter alia*, with the control of stills.

We have received from Messrs. Burroughs, Wellcome & Co., London, a copy of a neat little brochure entitled "Fighting Malaria." Copies are obtainable gratis from the South African house of the firm, 5 Loop Street, Capetown.

We have received copies of the following new season's catalogues from Mr. H. F. Benger, of 30 Loveday Street, Johannesburg:—(*a*) Spray pumps and accessories, white-washing machines, and Aspinwall axle-driven potato sprayer; (*b*) insecticides, fungicides, and farm chemicals; (*c*) bees, bee-hives, and appliances. Readers desirous of obtaining copies should make application to Mr. Benger.

The Hon. the Minister of Agriculture has ordered that all cattle in that portion of the Magisterial District of Lydenburg, Transvaal, known as Sekukuniland, shall be regularly dipped by the owners thereof at such time or times as is prescribed by the regulations published under Government Notice No. 1073 of 1912, in the fourteen-day dip, as prescribed by the above-mentioned regulations, and in the manner therein set forth.

Our attention has been called to an error which crept into the article on Rademeyer's Prickly Pear Exterminator, which appeared in the May issue of the *Journal*. In referring to the net results of the experiments with Rademeyer's preparations (see last paragraph on page 765), the cost of eradication was stated to have been cheaper by 7s. 2d. per acre; this should have read 7s. 2d. per *half-acre*.

We have received a copy of the second edition of Dr. Jerwitz's pamphlet entitled "Why is the application of Artificial Fertilizers so often a failure in South Africa, and how can it be made a success?" The pamphlet is issued in English and Dutch by the South African Agricultural Offices of the Potash Syndicate (P.O. Box 1031, Capetown), and gives the results of experiments on different crops conducted during the past season. Copies are obtainable free on application.

We have received from Mr. A. A. Persse, the Secretary of the South African Stud-Book Association, Box 703, Capetown, a copy of the seventh volume of the South African Stud-Book. A noteworthy feature of this

publication is that it is steadily increasing in size, an indication both of the growing sphere of the association's activities and of the presence in the Union of increasing numbers of pedigree stock. The Stud-Book is issued at the price of 10s. 6d.

Messrs. W. E. Clarke & Co., Tigerfontein, Mooi River, Natal, write:—In your July issue, page 117 (report on the Maritzburg show), we notice that we are credited with having obtained most points in the *Merino* classes. This is not correct: it should be *Shropshire* classes, not Merino. And this is not quite correct, as, although we took nearly all the prizes in Shropshires, there was no special prize for most points. As your report is not fair to Messrs. Robertson and no good to us, will you kindly correct it in your next issue.

The Hon. the Minister of Agriculture has ordered that all cattle in the Magisterial Division of Mount Ayliff, Transkei, shall be regularly dipped by the owners thereof at such time or times as is prescribed by the regulations published under Government Notice No. 1073, 1912, in the thirty-day dips as prescribed by the above-mentioned regulations, and in the manner therein set forth. Failure to comply with this order will render the owner liable to the penalties provided under section 21 of the Stock Diseases Act. This order has effect from the 22nd July.

BAGWORMS.—The manager of the Clan Syndicate, Natal, writes to Mr. Claude Fuller, Assistant Chief of the Division of Entomology, as follows:—"We have read with great interest the articles on the Wattle Bagworm. There is apparently one point on which you have not been as favourably situated as ourselves for observing and that is with reference to the ability of the male moth to take sustained flights. We may say that here we have seen them make a very long continuous flight, and have experienced very great difficulty in capturing them on the wing owing to their extreme rapidity of flight. In this they much resemble flies in their manner of darting about."

SALE AND PURCHASE OF CATTLE.—The following order has been made by the Hon. Minister of Agriculture:—"No person shall, without the written permit of the Principal Veterinary Officer or of a person appointed by the Minister to issue such permits, sell or purchase cattle in any area within the Union declared under the Act to be infected or suspected of being infected with East Coast fever." This order has been issued in view of the possibility that the unauthorized sale or purchase of cattle in areas infected or suspected of being infected with East Coast fever may act as an incentive to the illicit movement of stock, and thereby lead to the spread of the disease. Contravention of this order renders the person responsible liable to the penalties prescribed in section 21 of the Diseases of Stock Act, 1911.

CORRECTION.—In the course of a letter with reference to our notes on fibre-growing in Natal, in the June issue, Messrs. Manning & Collison write:—On page 821 you say, "Here two Indians were hard at work," etc. This should read, "Here two Indians and two natives were hard at work," etc., as each shift of our double raspador requires four operators, two to each machine. A more important error appears on page 826 wherein we state, "The profit per acre was, they had found from practical experience, £10 net." This should read, "£10 net, *annually*, as the immature leaves of the aloe plant ripen off in a few months after each cutting." This is a very important difference indeed, and might, if uncorrected, give an altogether wrong impression of the profit we are making from our industry.

HEAVIEST SHEEP IN GREAT BRITAIN.—The heaviest sheep in Great Britain is said to be an Oxford Down ram (Lord Inverurie, 7404), owned by Mr. James R. McHardy, of Bructor, Inverurie, Scotland. This ram weighs 4 cwt., his weight when lambed being over 24 lb. Lord Inverurie was bred by Mr. McHardy, and sired by Perth out of a twelve-year-old ewe, and he has an unbeaten showyard career, having won first and championship at Keith, Elgin, Huntly, Insch. Craigellachie, and other shows. He has already proved himself as a sire, his stock having won first prize for pen of five at Messrs. Keith & Anderson's sale in 1911. Most of Mr. McHardy's crop of this season's lambs are by Lord Inverurie. Mr. McHardy has been remarkably successful with his lambs this season, most of the ewes having dropped double lambs, or, as he puts it, he has had 175 per cent. of lambs per ewe.

*Plate No. XLVI.* POD MAIZE.

**Each grain is covered separately with a husk. This type of maize might prove valuable for ensilage. (The above is an incomplete specimen, having been broken in halves ere reaching us.)**

A VALUABLE FRIESLAND HERD.—Mr. Edward Downing, of Sheltered Vale, Rosetta, Natal, has recently imported a number of high-class Friesland

cattle from Holland, which should prove a valuable addition to the Sheltered Vale herd. This herd, at the Estcourt, Maritzburg, and Durban shows this year won 3 cups, 4 gold medals, 5 specials, 18 firsts, 17 seconds, 2 thirds, 9 highly commended, and 6 commended in pure-bred Friesland cattle alone. This is a notable achievement, upon which Mr. Downing is to be congratulated. The animals he has lately imported, which successfully passed the tuberculin test at Capetown, arrived in splendid condition, and included the following:—Friso (No. 5057 F.R.S.), a three-year-old bull (winner of four prizes in Holland), typical of exceptional quality and character with good dairy backing. Geertje III (No. 15809 F.R.S.), a very high-class four-year-old cow with good dairy backing. Geertje III and her dam both yield milk testing well over 4 % fat. She is in calf to a registered bull. Haaije XI (by No. 4036 F.R.S. out of 15030 F.R.S.) is a beautiful two-year-old heifer of great promise, typical, full of quality, with good dairy backing, and in calf to the bull Jonge Ceres (5896 F.R.S.). Tietje XXVII (by No. 4636 F.R.S. out of No. 15815 F.R.S.), a useful two-year-old heifer with good dairy backing, and in calf to No. 5282 F.R.S.

# Correspondence.

**This section is set aside for correspondence on all subjects affecting the Farming Industries of the Union of South Africa and cognate matters; and, while every reasonable latitude will be allowed, contributors are requested to be as concise and succinct as possible in the expression of their views.**

**Suggestions for practical consideration and discussion, and hints as to improved methods applicable to any branch of agriculture are particularly welcome.**

**It must at all times be distinctly understood that the Department of Agriculture is in no sense responsible for the views and opinions expressed in this section.**

**All communications should be clearly addressed "The Editor of the *Agricultural Journal*, Department of Agriculture, Pretoria," and written on one side of the paper only.**

## NITROGEN, LIME, PHOSPHATES, AND POTASH.

To the Editor of the *Agricultural Journal.*

SIR,—A correspondent in your July issue writing of nitrates, alludes to our few waterfalls. He could not be acquainted with Natal, where, in the lower reaches of the rivers especially, there is immense water power. By reason of its terraced formation, Natal is the country par excellence of water power, but it is all running to waste. Neither did he allude to clover as a source of nitrates. Every farmer has inexhaustible supplies of nitrogen on his farm, and by planting clover he can convert some of this into nitrates; this has been largely overlooked hitherto in this country. To grow clover successfully he wants cheap good lime, as much of our soil is deficient in this, but nothing has been done to open out our lime deposits. There is plenty of limestone in the country, but it needs connecting up with the railways.

Phosphates: I visited the deposits at Weenen, where there are large quantities of low-grade phosphate rock, and I have found phosphates in the same kind of strata in many places in Natal, but the scarcity of lime as a base precludes the probability of very extensive high-grade deposits being found. The Weenen deposits are probably due to infiltration of limewater from the overlying nodules of tufaceous limestone, which are very abundant there.

Potash: In the Umgeni River, near Durban, are very extensive deposits of sand, washed down from the granite hills above. Mixed up in this sand are abundant nodules of what I take to be orthoclase, potash felspar; how would these be as a source of potash for manure? Phillips gives the analysis of this as: Potash, 13; lime, 3 per cent. The nodules, which are the size of beans, could be easily sifted out from the sand, and the quantity is practically inexhaustible. The grinding them to a fine powder would be an easy matter.

Clover, one of the most important crops in other countries, is seldom grown here. How is this? It will grow well in the poorest soil if there is some lime in it; and as a fodder, or an improver of the soil, it has no equal. It is probably the cure for gal-lamziekte, which is most likely due to the poverty of the veld grasses in nitrogenous substances.—Yours, etc.,

OBSERVER.

Sweetwaters, Natal.

## BLUE-TONGUE.

To the Editor of the *Agricultural Journal.*

SIR,—What is the best time to inoculate sheep against blue-tongue in the Vryburg District? Most farmers inoculate in December, but I have been recommended to do it earlier, before or with the first rain. When inoculating early, will the protection last for the whole season?

What would be the best time to shear the sheep as shearing is said to favour the infection? Would it be a good plan to shear early and then dip regularly in an arsenical preparation? What must be the strength and what the intervals?

Would it be advisable to inoculate a high-priced ram, or would it be safer to keep him only under shelter during night time?—Yours, etc.,

ALEX. REDIKER.

Box 3, Brandfort.

[Mr. D. T. Mitchell, of the Veterinary Research Division, replies:—I advise early inoculation against the disease blue-tongue, before the first rain; as early as October or the beginning of November is very suitable. Protection is conferred for the whole season. I advise early shearing and regular dipping in some reliable arsenical dip like arsenite of soda, 2 to 2½ lb. to the hundred gallons of water, or well prepared lime and sulphur or lime and caustic soda. Many of the proprietary dips are also excellent. I have seen many fine imported rams pass safely through the inoculation, and do not think it is worth risking one uninoculated in a blue-tongue area as most likely he would contract the disease just when his services were required.]

## CONTAGIOUS ABORTION.

To the Editor of the *Agricultural Journal.*

SIR,—Can you inform me if the disease, contagious abortion in cows, has occurred in any Province of the Union; and, if so, in what district and under what circumstances? This seems to be an obscure disease and difficult to diagnose, but lately I have read that a method has been discovered by which the disease can be diagnosed with infallible certainty. I strongly suspect the disease amongst my cows and shall be glad to know if such is the case as, so far, the local Veterinary Department has been unable to discover the cause of the trouble.—Yours, etc.,

NEW HANOVER.

[Mr. D. T. Mitchell, of the Veterinary Research Division, replies:—Contagious abortion has been diagnosed amongst cattle in this country in the Transkei, Orange Free State, Pretoria, and Volksrust Districts. Diagnosis of

the disease can be made by the sero-agglutination test, and in all outbreaks in this country which have been investigated the test has been found to be quite reliable. For the purpose of diagnosis, blood should be drawn asceptically from the affected animal by a veterinary surgeon and allowed to coagulate; the serum which exudes is collected in a small sterile bottle and can then be forwarded to this laboratory for test. I shall be very pleased to have details of the disease which correspondent suspects to be contagious abortion in his cows, as we are at the present moment conducting a series of investigations into this disease and its occurrence.]

## DIARRHŒA IN CALVES.

To the Editor of the *Agricultural Journal.*

SIR,—Could you kindly tell me, through the columns of your journal, whether my three-year-old heifer, which died a few days ago, actually did so from the following cause:—

The heifer was in good condition, but a month ago began to suffer from diarrhœa, becoming poorer and poorer, until it eventually lay down and died. Thereupon I opened and carefully examined it, discovering nothing amiss beyond the fact that the milk-paunch (stomach) was filled with about 1 lb. weight of coarse sand and some balls of coarse grass, mixed with long tail-hairs from cattle. Other cases of a similar nature have occurred here, and I should be glad to learn whether any remedy exists against this evil.—Yours, etc.,

P. J. VAN ROOYEN.

Purekrans, P.O. Palala, via Nylstroom.

[The Senior Veterinary Officer, Transvaal (Mr. J. Christy), replies:—The sand, balls of coarse grass. and cattle tail-hairs in the stomach of the heifer helped to bring on the diarrhœa and accelerated death. Probably the heifer suffered from depraved appetite brought on by want of a proper supply of salt and bone-forming material in her food and water. I would suggest your giving your cattle a lick made of sterilized bonemeal, 1 part; slaked lime, 1 part; common salt, 10 parts. Mix thoroughly and place in boxes or troughs where the cattle can have access to it.]

## USE OF STABLE MANURE.

To the Editor of the *Agricultural Journal.*

SIR,—May I ask you to be so good as to inform me on the following:—

My garden is red loose friable soil and nine years ago was virgin veld. Since then it has been annually dressed with stable manure and has been regularly cropped with rotations of vegetables. There are a number of fruit trees on it as well as rose trees and other plants. I have a quantity of perfectly fresh stable manure, short and mostly dung (horse and mule). Is it better to dig this in at once or to let it lie in a heap for a month or so to heat and rot, and then dig it in? What is the relative value of fresh and rotten manure as a fertilizer?—Yours, etc.,

PERCY A. ROBERTSON.

Johannesburg.

[The Principal at the Potchefstroom School of Agriculture (Mr. E. J. Macmillan) replies:—Stable manure loses in total fertilizing constituents during the process of fermentation and rotting. It, however, becomes more concentrated and more readily available as plant food when well rotted, and is in a better condition to force the growth of a garden crop. There is another advantage in fermenting manure for the garden, in that weed seeds are destroyed. Manure should not be allowed to ferment in a heap until it becomes dried out and shows that white burnt appearance. Tramping hard and moistening with water assist in preventing this overheating. Horse manure is particularly liable to overheating and loss, and unless the rotting can be very carefully managed, it is advisable to apply such manure while fresh. Rotted manure varies greatly in composition according to the treatment it has received, and it is therefore difficult to state a correct ratio of its value to that of fresh dung.]

## SUNFLOWERS.

To the Editor of the *Agricultural Journal.*

SIR,—I would be greatly obliged if you would give me a little information about sunflowers.

Do they take much out of the ground, more than maize, for instance?

Could land in which sunflowers have been sown for, say, two seasons be used for maize with satisfactory results?

If maize were sown in a land the first year, sunflower the second, and maize the third, would the maize crop of the third year be as good as if maize had been sown in the second year instead of sunflowers?

Could land which will grow maize for four consecutive years with fair results, be used for sunflowers for a like period with equally good results? I do not mean the same piece of land, but, say, adjoining.

Could land which is played out so far as growing maize is concerned, mostly through rooibloem, be used for sunflowers profitably? Without manure in every case.—Yours, etc.,

P.O. Hlute, Swaziland. E. P. HILLARY.

[The Lecturer in Botany, School of Agriculture, Potchefstroom (Mr. T. O. Bell), replied:—Experiments to determine the advantage of various rotations in this country are very rare. In one experiment conducted here it was found that sunflowers were more exhausting as a crop than maize. A variety of summer crops were grown in thin strips across the field and wheat was sown the following winter across these strips. The wheat yielded as follows:—On land previously bearing legumes, 2460 lb. per acre; on land previously bearing maize, 1550 lb. per acre; on land previously bearing tobacco, 1250 lb. per acre; on land previously bearing sunflowers, 1045 lb. per acre; on land previously bearing linseed, 825 lb. per acre. The legumes, of course, actually enrich the soil as far as nitrogen is concerned. Sunflowers can be grown on rooibloem-infected land, and are not affected by it. The rooibloem seeds, however, remain dormant in the soil and will attack maize if sown again, even after a lapse of several years. With regard to the other queries, I cannot say definitely, though, generally speaking, land suitable for maize is also suitable for sunflowers, but, as mentioned above, sunflowers appear to be the more exhausting crop.]

## POLAND-CHINA PIGS.

To the Editor of the *Agricultural Journal*.

SIR,—I have been told that the China breed of pig is purely a lard pig and would suit my purpose. Would you please let me know if this breed is a lard type? Also where can a pair be obtained?—Yours, etc.,

F. C. LEPPAN.

Blanco, P.O. Tarkastad, C.P.

[The Lecturer in Agriculture, Elsenburg School of Agriculture (Mr. P. Fowlie), replied: The Poland-China breed of pigs is one of the best breeds for lard production in the world. It has been brought to a high degree of perfection in the United States of America and is the typical lard hog of the maize-growing states. I do not know any breeders of Poland-Chinas in South Africa.]

## VALUE OF WHEAT-HAY.

To the Editor of the *Agricultural Journal*.

SIR,—In reading about agricultural operations in some Australian papers, I noticed that a considerable acreage of wheat has been cut for hay; does wheat make a good hay and can it be fed to horses? I have noticed that it would often be more profitable to cut wheat for hay when the same is drying off instead of ripening, on account of drought; that is, if it can be fed to horses or mules as a roughage. All stock are very fond of wheat green, but I should like to know how it would answer when dried. Of course I know wheat straw can be fed to stock, but it is very poor provender, and I should think quite different from hay made from wheat.—Yours, etc.,

Cape Province. F. B.

[The Principal of the School of Agriculture, Grootfontein, Middelburg, C.P. (Mr. R. W. Thornton), replied:—Wheat-hay is largely used in Australia, and there is no reason why it could not be used in this country except that we are prejudiced in favour of oat-hay. I may mention, however, that the best wheat-hay in Australia is made from soft-strawed wheats grown especially for this purpose, but even the ordinary hard-strawed wheats make excellent hay; and often, to save a late crop from frost or in times of drought, if wheat were reaped at the proper stage a good supply of first-class hay would result. This hay is good for all classes of animals, though of course good oat-hay would be better for horses unless the right varieties of wheat were grown.]

## RATES OF SEEDING PER MORGEN.

To the Editor of the *Agricultural Journal.*

SIR,—Could you please inform me what amount of Hickory King seed, kaffir corn, monkey-nuts, and soy beans are necessary for a morgen of each, and what distance must the seeds be planted to get a good yield?—Yours, etc.,

BEGINNER.

Louis Trichardt.

[The Principal, School of Agriculture, Potchefstroom (Mr. E. Macmillan), replies:—Hickory King maize in rows 3½ feet apart; seeds 15 to 18 inches in the row; 20 lb. seed per morgen. Kaffir corn in rows 3½ feet apart and 9 to 12 inches in row; about 6 lb. seed per morgen. Soy beans in rows 3 feet apart; seed about 12 inches in rows; about 50 lb. seed per morgen. Monkey-nuts in rows 3 feet apart; seed about 12 inches apart in rows, or say 40 lb. seed per morgen.]

## APPLYING BASIC SLAG AND SUPERPHOSPHATE.

To the Editor of the *Agricultural Journal.*

SIR,—I shall be pleased to hear your reply to the following questions as they are of great importance to this neighbourhood. (1) Can basic slag or superphosphate be spread on land in March, while the land will only be ploughed and sown in May, without loss of the plant food which they contain? (2) Will it be necessary to plough or harrow at once after applying same, or may they be left on the surface without deteriorating? At the present time a man working with four ploughs must have a man to spread the fertilizer, and as labour is very scarce it would be an advantage if one could do this work at a slack time of the year.—Yours, etc.,

J. BRESLER.

P.O. Hermon, Cape Province.

[The Lecturer in Agriculture and Stock, School of Agriculture, Elsenburg (Mr. P. Fowlie), replies:—With regard to basic slag, not only will it do no harm to sow some months before the seed, but many authorities consider it is likely to have a better effect on the crop if it is put on some time before hand. Harrowing or ploughing is not necessary, but is advisable, as, although no loss takes place, some changes occur when moisture comes in contact with the slag, and it is generally preferred that it should be more or less mixed with the soil before this can happen. However, as the ground is usually hard and dry in March and ploughing difficult or impossible, I should say it would be preferable to sow the basic slag without even harrowing, rather than have to do the work at seed time. In the case of superphosphate, it is known that the soluble phosphates in this fertilizer become less soluble when they have lain in the soil for some time, and for that reason it is generally preferred by those who understand the nature of this fertilizer that it should be sown after ploughing and harrowed in so as to become well mixed with the soil at once. On this account I would hesitate to advise sowing it before ploughing, but I do not think that there would be much loss by doing so; and if I were in Mr. Bresler's position I should make a test next season if I were using superphosphate. I may add, however, that, so far as I can judge at present prices, basic slag is likely to give fully better results than superphosphate on all grain lands in the Western Province which have any tendency to sourness; and unfortunately a very large proportion of our lands are sour.]

## METHOD OF SPROUTING OATS.

In reply to an inquiry by Mr. D. H. Swart, Germiston, as to what is meant by sprouted oats, the Poultry Expert of the Potchefstroom School of Agriculture (Mr. Bourlay) writes:—

The method of sprouting oats is as follows:—The quantity of oats required are soaked overnight in a bucket of water and are then placed in boxes or tins which should have holes bored or punched through the bottom to allow drainage. No soil of any description is used, but a layer of the grain is placed in each box or tin to the depth of about one inch, these receptacles containing the oats

are then placed in a dark place and the grain is well watered once daily with an ordinary water can fitted with a rose spray. As a dark place in which to sprout oats, we use large tanks which are covered with old sacks in order to keep them dark, but packing cases would serve the purpose equally well. It is necessary to place the tins on bricks or pieces of wood so that they are raised from the floor of the sprouting chamber, otherwise they are likely to be partially submerged in water which is liable to accumulate from the daily watering. After the grain has been in the dark chamber for four or five days an examination will show that it has begun to throw out fine white roots, and this is quickly followed by young shoots or sprouts which rapidly grow until in ten or twelve days' time you have the tin or box full of lovely green sprouted oats which the fowls will eat greedily, if left too long the sprouts lose their fresh green colour and gradually turn yellow. While the oats have been sprouting the roots have also been growing rapidly, and by the time that the green food is ready it will be found that the grain has been bound together into a solid mass by these so that it is necessary to cut the mass into sections with a spade or sharp knife. The oats should not be watered for twenty-four hours before feeding in order that the roots and grain may dry out to a certain extent. When ready for use turn the whole mass out of the receptacle in which it has been grown, and cut up with a spade or knife into blocks, and give to the birds who will eat both the roots and the green growth. It is occasionally found, on turning out a tin of sprouted oats, that a certain amount of fermentation has set in at the bottom of the roots, in such cases it is necessary to cut off the affected parts for, if fed to the poultry, it is liable to cause disease.

## PLANTING AND STORING POTATOES.

To the Editor of the *Agricultural Journal.*

SIR,—I have this year started farming in the Potgietersrust District, and being a new hand at farming naturally I have a lot to learn. I imported and planted 500 boxes of French seed potatoes which did not turn out very prolific, but I attribute this to the hurried and primitive way of planting.

Would you kindly answer through your correspondence column in your next publication of the *Agricultural Journal* the best and most progressive way of planting seed potatoes. Whether drilling, ploughing in, or using the potato planter, or any other progressive and up-to-date way. Also, how should the new seed obtained from the first planting of the imported seed be preserved. I am sorry to say I lost the seed I saved for this winter's planting, by what I think is called tuber moth.—Yours, etc.,

JEFF.

Potgietersrust.

[The Principal, School of Agriculture, Potchefstroom (Mr. E. Macmillan), replies:—Potatoes should be planted in rows 3 feet apart, 2 feet in the rows, and 5 to 6 inches deep. There is no good reason why a satisfactory crop should not be obtained from a field planted after the plough, though this method is not so accurate as by means of drilling or machine planting. In the case of a dry-land crop the ground should be harrowed and levelled immediately after planting, whichever method is used. The potatoes obtained from the imported seed may be left in the ground during the winter season or until 1st August. The rows should be hilled up during March as a protection against the tuber moth. It is difficult to hold the seed over until December without the aid of cold storage. When taken from the ground the potatoes should be stored in a dry place and kept as cool as possible. Storing in long heaps, placed in a shady situation, and covered with grass and earth, leaving a space without earth on the top for ventilation, is helpful for the first three months. The seed should then be picked over and sprouted, if necessary, and placed in open bins.]

## PRUNING VINES.

To the Editor of the *Agricultural Journal.*

SIR,—I have on my farm a vineyard of about 350 vines. It is six years old, and stands on good, fertile red sandy ground, but does not bear. Kindly inform me how to prune such a vineyard.—Yours, etc.,

J. N. STRUISS.

Salzmanspan, P.O. Brandfort.

[The Assistant Government Viticulturist (Mr. W. Wagener) replies:—That the vines do not bear may be the result of different causes. I assume that the vines are healthy and showing satisfactory growth. One cause might be that the vines are not pruned in the proper way, or that the weather conditions during blossoming are very unfavourable, causing the bunches to drop their berries. But probably in your case the fault lies in the pruning of the vines. If it has been your practice to give the vines short bearers of two buds, it will be advisable to give them another two to four long bearers with eight to ten buds (according to the luxuriance of the vine). The long bearers should be bent in the form of a bow to the middle of the vine and be tied or plaited together. The short bearers will provide the long and short bearers for the following year, when the old long bearers are removed close to the stem. If your vines grow very luxuriantly you ought to prune late. In this case they should not be fertilized with nitrogen but given potash, and epsecially phosphoric acid. A few bags of basic slag per morgen will certainly have a very good effect in your case.]

## PLANTING SHOOTS FROM GRAFTED VINES.

To the Editor of the *Agricultural Journal.*

SIR,—Three years ago I planted some grafted vines, and now I want to plant of shoots from them. I would like to know whether I can do this and whether the shoots will bear. The vines are red and white hanepoot.—Yours, etc.,

T. J. VORSTER.

P.O. Postmasburg.

[The Assistant Government Viticulturist (Mr. W. Wagener) replies:—Shoots taken from grafted vines are, of course, not grafted when planted. These shoots, when planted, will bear fruit if the vines from which they have been taken have borne fruit. If phylloxera is present in the vineyard, the roots of these shoots will be attacked by it. They cannot withstand it and die. I presume that the original vines were grafted, and that phylloxera is prevalent in the district. Therefore it will be advisable to plant only such vines which have been grafted on American stocks (in correspondent's case 1202 or 101-14, according to the nature of the ground) which resist phylloxera.]

## EXPORT OF EGGS.

To the Editor of the *Agricultural Journal.*

SIR,—Referring to your issue of November, 1912, Vol. IV, No. 5, pages 748 and 756, on the subject of export of eggs from South Africa to London, it may interest you to know that I have written to Sir Owen Philipps, Chairman of the Union-Castle Mail Steamship Co., in order to get special low rates of freights for carrying utility breeding poultry from England to South Africa for improving the egg-laying stocks there, and which would help forward the South African egg export very considerably. I now enclose copy of reply from Sir Owen Philipps, 24th July, 1913, to which I attach copy of my letter of 30th July, 1913, for your information.—Yours, etc.,

I. GUNDLE.

21 Lime Street, London, E.C.

The following are the enclosures referred to:—

I. GUNDLE, Esquire.

DEAR SIR,—I am in receipt of your letter of 22nd July, with enclosure, on the subject of the South African poultry farming industry, and note carefully all you say.

While sympathizing very much with the objects you have in view, and fully appreciating the advantage to any industry of free freight arrangements, I feel sure you will realize that the terms of the new mail contract in relation to pedigree stock (which were arrived at after very full and careful discussion) involve upon the Company an onerous responsibility.

I may say that I have been approached from time to time by those interested in various branches of stock farming in South Africa (poultry farmers

among the number) with a view to widening the scope of the arrangement by the inclusion of other classes of stock; but I have been obliged to say, and regret to have to do so in your case also, that it is not possible for me to vary the conditions of the mail contract in this respect.

I am much interested in the progress which South Africa is making in dairying and poultry, and I sincerely hope the good prospects you indicate may be fulfilled. The Company will always be prepared to deal sympathetically with questions relating to shipment of South African produce.—Yours, etc.,

OWEN PHILIPPS.

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Sir OWEN PHILIPPS.

DEAR SIR,—I beg to acknowledge your favour of the 24th instant, and thank you for your sympathetic consideration of freight on laying poultry to South Africa.

I am carrying on this propaganda with the object of helping to create a new industry for South Africa, the benefits of which would be shared by the whole community, and would eventually result in regular and large shipments of poultry and eggs being sent Home to the London markets, and I hope the matter will again have your kind consideration at some future period.

Thanking you for your courtesy,—Yours, etc.,

I. GUNDLE.

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# Egg-laying Competitions.

## NOTES AND FIGURES FOR JULY.

MR. W. O. JOHN, Poultry Division, Elsenburg School of Agriculture, writes :—

I submit report of my monthly visit to Rosebank laying competition, Cape Province.

The date of visit was 1st August. The runs have been greatly improved by drainage since my previous visit. The weather during the month has been very wet (in fact, the wettest for a great number of years); only a few bright warm days to record, with very varying temperatures of from 60 degrees during day to 32 during night. Notwithstanding these drawbacks the birds look remarkably fit and well.

The feeding during July has been altered somewhat from the two previous months. They now get crushed mealies twice weekly and cooked liver on two days a week. On the other days they get wheat scattered in the scratching litter in the morning; sprouted oats and cabbage leaves midday; and mash composed of 42½ per cent. bran, 42½ per cent. pollard, 15 per cent. whale meal, in the evening. One noticeable feature about the birds (i.e. the Leghorn section) is the fact that quite a number of eggs are under weight. The birds laying these small eggs are in my opinion too small, although conforming in size to the White Leghorn Club standard. I notice that the birds that lay the best eggs are somewhat

larger than this standard's requirements. The undersized bird is certainly a factor that has to be guarded against, as the size of the eggs laid must be given due consideration. $1\frac{3}{4}$ oz. per egg is quite small enough, yet 120 eggs fail to turn the scale at this weight.

## ROSEBANK EGG-LAYING COMPETITION.

## WESTERN PROVINCE AGRICULTURAL SOCIETY.

(1*st May*, 1913, *to* 30*th April*, 1914.)

RECORD FOR JULY, 1913.

| Pen Number. | Owner. | Variety. | Record for July. | Total to 31st July. |
|---|---|---|---|---|
| 1 | F. T. Mills ... ... ... ... | White Rocks ... ... | 24 | 58 |
| 2 | N. H. M. Cole ... ... ... ... | White Wyandottes ... | 70 | 131 |
| 3 | F. T. Mills ... ... ... ... | White Rocks ... | 0 | 0 |
| 4 | S. C. Skaife ... ... ... ... | White Wyandottes ... | 52 | 207 |
| 5 | E. F. Watermeyer ... ... ... | Croad Langshans ... | 8 | 35 |
| 6 | H. H. Bright ... ... ... ... | White Leghorns ... | 53 | 82 |
| 7 | S. Smith ... ... ... ... ... | " ... | 64 | 213 |
| 8 | N. H. M. Cole ... ... ... ... | Brown Leghorns ... | 66 | 158 |
| 9 | Jas. Cook... ... ... ... ... | White Leghorns ... | 49 | 123 |
| 10 | R. G. Hudson ... ... ... ... | " ... | 43 | 108 |
| 11 | N. H. M. Cole ... ... ... ... | " ... | 42 | 100 |
| 12 | Hatherley Poultry Farm ... ... | " ... | 39 | 114 |
| 13 | C. S. Boyes ... ... ... ... | " ... | 44 | 156 |
| 14 | H. H. Bright ... ... ... ... | " .. | 42 | 85 |
| 15 | Mrs. R. F. Dott ... ... ... ... | " ... | 36 | 94 |
| 16 | T. Vollmer ... ... ... ... | " ... | 15 | 17 |
| 17 | " ... ... ... ... | " ... | 48 | 75 |
| 18 | C. W. Baldock ... ... ... ... | " ... | 65 | 174 |
| 19 | S. Smith ... ... ... ... ... | " .. | 14 | 120 |
| 20 | Mrs. R. Archibald ... ... ... | " ... | 27 | 141 |
| 21 | B. Kauffmann ... ... ... ... | " ... | 57 | 141 |
| 22 | G. J. V. Biccard... ... ... ... | " ... | 42 | 92 |
| 23 | C. S. Boyes ... ... ... ... | " ... | 53 | 65 |
| 24 | H. H. Bright ... ... ... ... | " ... | 52 | 89 |
| 25 | S. Smith ... ... ... ... ... | " ... | 20 | 78 |
| 26 | W. L. H. Rose ... ... ... ... | " ... | 21 | 53 |
| 27 | H. N. Wheeldon ... ... ... ... | " ... | 68 | 156 |
| 28 | B. Kauffmann ... ... ... ... | Black Leghorns ... | 44 | 121 |
| 29 | O. C. Macpherson ... ... ... | White Leghorns ... | 17 | 64 |
| 30 | W. and H. Meihuizen ... ... ... | " ... | 56 | 96 |
| 31 | Graham Hope & Co. ... ... ... | " ... | 71 | 160 |
| 32 | H. Curtis... ... ... ... ... | " ... | 45 | 68 |
| 33 | A. Aitken... ... ... ... ... | " ... | 33 | 38 |
| 34 | R. G. Hudson ... ... ... ... | " ... | 37 | 74 |
| 35 | H. H. Bright ... ... ... ... | Black Leghorns ... | 74 | 81 |
| 36 | G. J. V. Biccard... ... ... ... | White Leghorns ... | 41 | 72 |
| 37 | W. H. Hart ... ... ... ... | " ... | 19 | 47 |
| 38 | R. G. Hudson ... ... ... ... | " ... | 31 | 49 |
| 39 | B. Kauffmann ... ... ... ... | " ... | 39 | 104 |
| 40 | Mrs. R. A. Leggatt ... ... ... | Anconas ... ... | 47 | 96 |

## ELSENBURG MONTHLY REPORT FOR JULY OF EGGS LAID BY BREEDING PENS.

| Pen No. | Breeds. | No. of Hens. | May Eggs. | June Eggs. | July Eggs. | Total Eggs. |
|---|---|---|---|---|---|---|
| 1 | Indian Game ... ... ... ... ... | 3 | 23 | 11 | 15 | 49 |
| 2 | Black Rocks ... ... ... ... ... | 4 | 37 | 30 | 73 | 140 |
| 3 | White Rocks ... ... ... ... ... | 4 | 53 | 67 | 48 | 168 |
| 4 | White Wyandottes ... ... ... ... | 6 | 86 | 64 | 76 | 226 |
| 5 | Barred Rocks ... ... ... ... ... | 3 | 50 | 39 | 28 | 117 |
| 6 | White Leghorns ... ... ... ... ... | 5 | 67 | 73 | 68 | 208 |
| 7 | Black Minorcas ... ... ... ... ... | 6 | Nil. | Nil. | 29 | 29 |
| 8 | Black Leghorns ... ... ... ... ... | 6 | 61 | 65 | 59 | 185 |
| 9 | Brown Leghorns ... ... ... ... | 6 | 32 | 31 | 52 | 115 |
| 10 | White Orpingtons ... ... ... ... | 4 | 94 | 75 | 49 | 218 |

During July the weather has been very bad, heavy drenching rains for many days. Bright warm days very few. The greatest pen improvement during the month is the four Black Rocks in pen 2 with 73 eggs, more than double their June output. Pen 9, although a long way behind, has made substantial progress during month. Broodiness has been a source of worry, pen 10 being most persistent, hence their lower monthly record. They should do better next month, as only one is now broody. One Australian White Leghorn in pen 6 is also broody. The White Wyandottes, pen 4, are missing the assistance of the bird that has been sick last month: although back in the pen, she has gone in full moult. Pen 7 has now commenced laying. Health of birds good.

W. O. JOHN, Poultry Division.

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## MANAGER'S REPORT FOR JULY, 1913.

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As expected, there has been a considerable increase in the yield of eggs this month, in spite of the winterly weather prevailing.

An increase on last month of 605 eggs has been recorded, the total collected being 1790, but unfortunately 120 eggs below 1¾ oz. (the minimum allowed after 30th June) have had to be deducted, ranging from 1 per pen for the month to 23 in the case of one pen. The majority were laid early in the month, and for the last few days only one or two per day from the whole 40 pens have been below the minimum, whilst 22 pens have had none at all under weight. The lowest daily record during the month has been 34 on the 3rd and the highest 83 on 25th inst. The largest number of eggs laid after allowing deductions has been from pen No. 35 (Black Leghorns) with a total of 74, followed by pen No. 31 (White Leghorns) of 71, and pen No. 2 (White Wyandottes) 70, and close up pen No. 27 with 68, pen No. 8 with 66, pen No. 18 with 65, and pen No. 7 with 64. Pens Nos. 4 and 7 have had their totals spoilt by deductions, but are gradually improving in respect to size of eggs. There have been disappointments with the laying of some pens, especially No. 13, which practically stopped the middle of the month and has only just started again, yet they have been in good health all the time as far as could be judged. One hospital case has occurred, that of a bird which became egg-bound. It was at once treated by injecting warm water and afterwards warmed oil, which after some time caused the eggs to come away, though owing to the pain, etc., she lost the use of her legs for several days, but has now quite recovered. Two birds of pen No. 4 have been broody for some days, one persistently so, but are now laying again; also one of pen No. 2 for four days, now returned to pen. Three cases of worms have also been treated. The whole of pen No. 19 suffered from sour crop early in the month, two birds being specially bad, and they were treated as mentioned last month in a similar case, which caused lumps of sour food to come away. They are now practically well, as the pen has started laying again, although the worst bird still shows effects. Some other cases of slight indisposition being noticed, a change of food was made by giving, from the third week, cooked liver and the broth twice a week in the mash in place of the whole meat. This livened things up considerably, and there is now great excitement and a rush for the evening feed, where before some pens even left a part of it. It is not well to keep to one class of

feed continually, however well balanced the ration may be, and since the change there has been a noticeable increase in the egg yield and the birds evidently appreciate the change. There is still some difficulty in procuring a regular supply of green food, so that the birds have had to fall back on grass weeded from the lucerne bed when the weather permitted. A start has been made with the planting out of the thousand-headed kale from the most advanced seed bed, and one exhibitor has kindly sent some mangel plants as those here were not yet ready for transplanting. A few cases of partial moulting have still to be mentioned, but, generally speaking, the birds have quite recovered from this trouble and many of them are laying. Pen No. 3 has another blank to its record, being loth to throw off its chickenhood, but should certainly begin next month, and will probable come on with a rush, as the birds are in grand condition.

Owners will do well to hatch heavy breeds earlier in the season for another competition.

The month has been the wettest for years, deluges of rain having fallen some days, the 11th and 28th especially, but since the drains were deepened this has run quickly off the ground. Owing to the slope of the roofs being the wrong way the birds have been a good deal troubled during the rain going in and out of the houses. The temperature has varied a good deal, from frost (32 degrees) on the night of the 16th, to 62 degrees the day of the 13th, but the latter part of the month has been rather more even generally. The eggs laid as a rule have been well over the minimum, and those which were small were generally from the youngest pullets. Given warmer weather the egg supply will show another marked increase during August, as the backward pens should do their share, and the health keeping good as at present will give the egg collector plenty of employment.

S. A. WEST, Manager.

NOTE.—From 1st July all eggs under $1\frac{3}{4}$ oz. have been disqualified.

# South African Produce Markets.

## CAPETOWN.

The Produce Department of the firm of R. Müller, Capetown, reports under date of the 29th August, 1913, as follows :—

*Ostrich Feathers.*—Since sending in my last report news came to hand concerning the continuance of the auction sales which were held in London towards the end of last month. The final result may be summed up as follows :—

Whites, feminas, white boos, long and medium blacks, all declined 10 per cent.; spadonas declined 15 per cent.; long and medium drabs advanced 5 per cent.: medium and short drabs advanced $12\frac{1}{2}$ per cent.; medium floss advanced 10 per cent. All other classes of feathers were disposed of at unchanged rates.

In sympathy with the London market, Capetown sales, both by public auction and out of hand, were effected at a decline of 5 to 10 per cent. The supplies of feathers in this market having been rather small of late, it is to be expected that higher prices will, ere long, be obtainable here, as the local industry is always requiring goods. This fact continues to be of great advantage for th's market.

Prices ruling now are as follows :—

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| Primes | 18 | 0 | 0 | to | 37 | 0 | 0 |
| First | 9 | 10 | 0 | „ | 15 | 10 | 0 |
| Second whites | 6 | 10 | 0 | „ | 9 | 10 | 0 |
| Third whites | 4 | 10 | 0 | „ | 6 | 10 | 0 |
| Inferior and stalky whites | 3 | 0 | 0 | „ | 4 | 10 | 0 |
| Byocks and fancy | 3 | 10 | 0 | „ | 10 | 0 | 0 |
| Superior feminas | 11 | 10 | 0 | „ | 15 | 0 | 0 |
| First feminas | 8 | 10 | 0 | „ | 10 | 10 | 0 |

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| Second feminas | 5 | 10 | 0 | to | 7 | 10 | 0 |
| Third feminas | 2 | 10 | 0 | „ | 4 | 10 | 0 |
| Greys | 3 | 10 | 0 | „ | 9 | 10 | 0 |
| White boos | 1 | 15 | 0 | „ | 2 | 10 | 0 |
| Light boos | 1 | 0 | 0 | „ | 1 | 15 | 0 |
| Dark boos | 0 | 5 | 0 | „ | 0 | 15 | 0 |
| Inferior boos and tipless | 0 | 5 | 0 | „ | 1 | 5 | 0 |
| Long blacks | 3 | 0 | 0 | „ | 5 | 10 | 0 |

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| Medium blacks .... | 1 | 5 | 0 | to | 2 | 10 | 0 |
| Short blacks ...... | 0 | 5 | 0 | „ | 0 | 15 | 0 |
| Long floss blacks... | 1 | 10 | 0 | „ | 2 | 0 | 0 |
| Medium floss blacks | 0 | 17 | 6 | „ | 1 | 10 | 0 |
| Short floss blacks... | 0 | 5 | 0 | „ | 0 | 10 | 0 |
| Long drabs........ | 2 | 10 | 0 | „ | 3 | 10 | 0 |
| Medium drabs ..... | 0 | 10 | 0 | „ | 2 | 0 | 0 |
| Short drabs........ | 0 | 2 | 6 | „ | 0 | 10 | 0 |

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| Long floss drabs.... | 1 | 15 | 0 | to | 2 | 5 | 0 |
| Medium floss drabs | 0 | 17 | 6 | „ | 1 | 10 | 0 |
| Short floss drabs ... | 0 | 5 | 0 | „ | 0 | 10 | 0 |
| Inferior long blacks and drabs....... | 0 | 15 | 0 | „ | 2 | 10 | 0 |
| Common blacks and drabs .......... | 0 | 2 | 0 | „ | 0 | 5 | 0 |
| Spadonas ......... | 1 | 0 | 0 | „ | 5 | 10 | 0 |

*Wool.*—Only small parcels arrived in this market during the current month. This is not surprising at all, as farmers cannot be expected to shear whilst the cold weather is lasting.

The following are to-day's Capetown quotations:—

| | d. | | d. |
|---|---|---|---|
| Calvinia, long.................. | 7 | to | 7¾ |
| Calvinia, medium .............. | 6 | „ | 7 |
| Karroo and Roggeveld........... | 6 | „ | 9½ |
| Short burry wools, heavy........ | 4 | „ | 4¾ |
| Short burry wools, light......... | 4¾ | to | 5½ |
| C. and C., best grease........... | 6 | „ | 6½ |
| C. and C., medium ............. | 5 | „ | 6 |
| C. and C., inferior ............. | 2 | „ | 4 |

*Skins.*—In quantity and quality the usual consignments have arrived here during the month of August, and there has been no difficulty in realizing satisfactory sales. Exporters take up any quantities, so that no stock is accumulating, which, of course, is of great importance.

Sales can be readily effected in Capetown at the following rates:—

| | |
|---|---|
| Goatskins, light ............ | 12¾d. per lb. |
| Goatskins, heavy............ | 10¾d. per lb. |
| Sundried and kids........... | 8d. per lb. |
| Caledon..................... | 7d. per lb. |
| Longwools, Karroo .......... | 6¼d. per lb. |
| Shortwools ................. | 5d. per lb. |
| Pelts and damaged .......... | 4½d. per lb. |
| Angoras..................... | 7d. per lb. |
| Angoras, bastard ............ | 10d. per lb. |
| Angoras, shorn.............. | 5½d. per lb. |
| Capes, large ................ | 3s. 5d. each. |
| Capes, medium ............. | 2s. 7d. each. |
| Capes, cut.................. | 1s. 7d. each. |
| Capes, damaged and lambs ... | 7d. each. |

*Hides.*—There is no change to be reported for this market. Sound heavy hides change hands at 11d. per lb., damaged hides at 8d. per lb. At these prices export houses take up any quantities readily.

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## EAST LONDON.

The Produce Department of Messrs. Malcomess & Co., Ltd., write as follows under date 30th August, 1913:—

The month under review marks a period of absolute quiet, characteristic of the "between seasons" month of the year.

In Europe the manufacturers have had their holiday period, and the Balkan muddle has, with the financial stringency, prevented any marked improvement.

In America everyone is marking time pending definite settlement of the tariff question.

The Bradford market, which opened the month with a quotation of 28½d., fell away a little but recovered to a farthing advance at 28¾d.

Locally stocks are not more than 400 bales, and nothing is being done. We shall quote for wool next month, when we shall be in a better position to form an opinion as to the future of the market.

*Mohair.*—This market also is very quiet, and winter hair in particular is being influenced by the uncertainty of settlement of the American Tariff Settlement. We quote:—

| | | | |
|---|---|---|---|
| Very best long blue mohair, free from kemp...... | 12½d. | to | 13d. |
| Good long blue, slightly kempy ................. | 11½d. | „ | 12¼d. |
| Superior Herschel hair......................... | 11½d. | „ | 12d. |
| Superior Basuto hair .......................... | 10½d. | „ | 11d. |
| Average Basuto hair........................... | 9½d. | „ | 10d. |
| Coarse Basuto hair ........................... | 6½d. | „ | 8d. |
| Genuine winter kids........................... | 11½d. | „ | 12d. |
| Super. winter hair............................ | 10d. | „ | 10½d. |
| Average winter hair........................... | 9½d. | „ | 10d. |

But, as stated, the winter hair prospects are very uncertain, and it is possible prices may go a little higher.

*Sundry Produce.*—This market has been a little more active and we quote prices which in some cases register an advance.

| | | | |
|---|---|---|---|
| Sundried hides | 12¼d. to 12½d. | Goatskins | 11¾d. to 12d. |
| Dry-salted hides | 11¼d. „ 11½d. | Bastards | 9¾d. „ 10d. |
| Sheepskins—1st quality | 6¼d. „ 6⅝d. | Angora skins | 7¾d. „ 8d. |
| „ C. and C. skins | 5¾d. „ 6d. | Damaged | 5d. each. |
| „ Transkeis | 4¾d. „ 5d. | Horns, according to quality and size (each) | 2d. to 3d. |
| „ Pelts | 4½d. | | |

## DURBAN.

Messrs. Reid & Acutt's Wool Mart, Ltd., Esplanade, Durban, report as follows under date 30th August, 1913:—

*Wool.*—The local market during the month just closed has continued extremely quiet, no supplies having been available. Everything, however, points to an early season this year, and before our next monthly report is issued we expect that many of the buyers will have returned, and that arrivals of wool will be fairly representative.

Without definite realizations to guide us, it is of course impossible to form a really reliable basis of prices, but at the moment there seems no reason why values should not maintain the level established at the close of last season. In fact, if the revised American tariff comes into operation in the immediate future, the effect should at once be felt in the South African markets, and the increased competition which may be anticipated cannot but have a beneficial effect upon prices generally.

In our next report we shall be able to recommence our detailed quotations for the various districts' wools: meantime, we will take the opportunity of issuing an early word of warning to farmers.

The coming month will doubtless be a somewhat rainy one in many districts, and growers cannot be too strongly recommended to see that their wools are absolutely dry before clipping; it should always be borne in mind that a damp clip means a disappointing realization. We mention this matter at a rather early date in preference to being "wise after the event."

*Mohair.*—Although no decent sized parcels have yet been catalogued, we are advised that the new clip is now moving in some portions of the Free State. The brisk inquiry mentioned in our last report has still continued, and prospects appear quite promising Current values are as follows:—

MOHAIR.

| | |
|---|---|
| Kids, good length and super quality | 13d. to 17d. |
| Long blue, super quality | 12d. „ 13d. |
| Long blue, average | 11d. „ 12d. |
| Good winter | 9½d. „ 10½d. |
| Short and mixed winter | 8½d. „ 9½d. |
| Inferior and coloured | 3d. „ 6d. |

BASUTOLAND AND NATIVE MOHAIR.

| | |
|---|---|
| Good length and quality | 11d. to 12d. |
| Average lots | 10d. „ 11d. |
| Inferior and short mixed | 6d. „ 8d. |

COARSE AND COLOURED.

| | |
|---|---|
| Free from kemps | 5¼d. to 6d. per lb. |
| Ordinary | 4d. „ 5d. „ |
| Inferior, kempy, and Persian | 2d. „ 3d. „ |

HIDES, SKINS, HORNS, ETC.

Sheepskins are, if anything, the turn easier, but we do not think it necessary to revise our quotations. Hides continue in very strong request at excellent prices.

| | |
|---|---|
| Hides, sundried, 14 to 20 lb. average | 11d. to 13d. per lb. |
| „ sundried, inferior | 8d. „ 9d. „ |
| „ salted | 8½d. „ 10d. „ |
| Sheepskins, long woolled | 5½d. „ 6½d. „ |
| „ short woolled | 3½d. „ 4½d. „ |

| | |
|---|---|
| Sheepskins, pelts | 1½d. to 3d. per lb. |
| " coarse and coloured | 3d. " 5d. " |
| " salted heavy | 4d. " 5½d. " |
| Goatskins, mixed parcels, sound | 4d. " 6½d. " |
| " inferior | 2d. " 3d. " |
| Horns | 3d. " 12d. per pair. |

WATTLE BARK.

The improvement recently advised still continues, prices being as follows:—

| | |
|---|---|
| Cut and bagged, good colour and quality | 4s. 6d. to 5s. 6d. per cwt. |
| " " inferior colour and quality | 3s. 0d " 4s. 6d. " |
| Uncut, in bundles, good colour and quality | 3s. 0d. " 4s. 0d. " |
| " " inferior | 2s. 0d. " 3s. 0d. " |

## PORT ELIZABETH.

Messrs. John Daverin & Co. report as follows under date 1st September, 1913:—

*Ostrich Feathers*.—The following are particulars of the results of the London July feather sales as received per mail. The London brokers quote the following changes in prices as compared with the closing rates of the June sales:—

Whites.—Best 10 per cent. lower; average, ordinary, and common 5 to 10 per cent. lower.

Feminas in general showed rather less decline than whites, except dark feminas and greys, which advanced 10 per cent.

Fancies.—Firm at unchanged rates.

Spadonas were in very large supply and prices declined 10 to 15 per cent.

Blacks.—Long and medium declined 10 to 15 per cent., but shorts were unchanged.

Drabs.—Long were firm to 5 per cent. advance, medium and short advanced 10 per cent.

Tails.—Good white 10 per cent. lower, ordinary 5 per cent. lower, dark and coloured unchanged.

Floss.—Firm at 5 per cent. advance.

The quantity offered was over 119,000 lb. and the total amount realized £338,000. The general quality of the offering was below the average of the June sales.

The sales on the whole proved disappointing to shippers; wings, blacks, and spadonas having declined considerably more than had been anticipated; the advance on drabs and floss, etc., being comparatively unimportant, as the value of these lines in a general all-round parcel is almost negligible as compared with that of the wings. The principal cause of the decline is stated to be the lack of support from American buyers. Trade in America is a most important factor in the feather market, as that country in the ordinary way probably consumes more than half of the world's supply, and we cannot see much likelihood of any decided improvement until there is a recovery in the American trade. Trade in Continental and Home centres is reported to be fair, but business is bound to be more or less restricted whilst political affairs in Europe remain unsettled. Our London correspondents reports that they consider the ultimate prospects favourable, but we think it possible that we may not see any marked improvement here until possibly the turn of the year, unless there should be any revival of the American demand in the meantime, and of this latter eventuality there are no signs at the present.

Our local market has responded to the alterations in prices quoted from London, and all superior wings (whites in particular) as well as blacks in general, and all spadonas, have marked a further fall. Buyers are complaining of restricted orders, and it is mainly due to speculatively buying that prices of good wings and blacks have not gone lower still. We do not think, however, that the prices of these descriptions are likely to show further decline, being so low already as compared with other lines. Spadonas on the other hand may possibly show a further drop, as this description is liable to sudden and severe fluctuations.

Stocks on hand here are fairly large, and new goods are commencing to come forward rather more freely. A considerable proportion of present holdings consists of parcels bought at high prices by country traders in April–May, and these naturally cannot be realized on the present market without loss. Some owners are now deciding to realize, take their loss, and restock at current rates—and this, we think, may perhaps prove the wisest course to take—while others prefer to hold longer on the chance of some early improvement. Nevertheless, a good business is now being done on the basis of the lower rates—which may not be

considered as established. Parcels of average to good quality which are offered without limits and sold unrestrictedly usually sell satisfactorily, and frequently realize considerably over valuations. There is also a fair demand for unsorted parcels out of hand, and any new parcels arriving in Port Elizabeth can usually be readily placed, provided owners are prepared to accept current market rates.

The usual three days' sale was held this week, and an ordinary average assortment was offered. Competition was dull and prices inclined to be weak when common and undesirable lots were under offer, but good quality parcels sold fairly freely, unless excessive limits were attached. On the whole we can quote no change in prices as compared with last week. The lower range of prices for good wings—also long blacks and spadonas—is now established, and a good volume of business is being done at the reduced rates.

Owners who are willing to meet the market and accept current rates are now obtaining full market value for their goods, which are put forward without reserve; but, on the other hand, holders of dear parcels who try to force the market usually meet with very little success, and have to withdraw their goods.

The quantity of new arrivals is increasing, and it seems probable that stocks and supplies must show a marked increase next month.

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| *Primes:* | | | | | | | |
| Extra super | 18 | 0 | 0 | to | 28 | 0 | 0 |
| Good | 14 | 0 | 0 | „ | 16 | 0 | 0 |
| *Whites:* | | | | | | | |
| Good to super | 10 | 0 | 0 | „ | 12 | 10 | 0 |
| Good average | 7 | 10 | 0 | „ | 8 | 10 | 0 |
| Average | 6 | 0 | 0 | „ | 7 | 0 | 0 |
| Common and narrow | 3 | 10 | 0 | „ | 5 | 0 | 0 |
| Good broken | 7 | 0 | 0 | „ | 9 | 10 | 0 |
| Thirds | 2 | 0 | 0 | „ | 4 | 0 | 0 |
| *Fancies:* | | | | | | | |
| Good | 6 | 10 | 0 | „ | 8 | 0 | 0 |
| Ordinary | 4 | 0 | 0 | „ | 5 | 10 | 0 |
| *Feminas:* | | | | | | | |
| Super | 9 | 0 | 0 | „ | 12 | 0 | 0 |
| Good average | 6 | 10 | 0 | „ | 8 | 0 | 0 |
| Average | 4 | 0 | 0 | „ | 5 | 10 | 0 |
| Common and narrow | 2 | 5 | 0 | „ | 3 | 5 | 0 |
| Good broken | 5 | 0 | 0 | „ | 7 | 10 | 0 |
| Thirds | 1 | 10 | 0 | „ | 2 | 10 | 0 |
| *Greys:* | | | | | | | |
| Good | 6 | 0 | 0 | „ | 7 | 10 | 0 |
| Ordinary | 3 | 10 | 0 | „ | 4 | 15 | 0 |
| *Tails:* | | | | | | | |
| Male, good, big, bold | 2 | 5 | 0 | „ | 3 | 5 | 0 |
| Male, good average | 1 | 15 | 0 | „ | 2 | 0 | 0 |
| Short and narrow | 0 | 15 | 0 | „ | 1 | 0 | 0 |
| Female, light, good, big, bold | 1 | 10 | 0 | „ | 2 | 10 | 0 |
| Female, light, good average | 1 | 5 | 0 | „ | 1 | 10 | 0 |
| Female, light, short and narrow | 0 | 10 | 0 | „ | 0 | 12 | 6 |

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| *Tails*—(contd.): | | | | | | | |
| Female, dark, good, big, bold | 1 | 0 | 0 | to | 1 | 15 | 0 |
| Female, dark, good average | 0 | 15 | 0 | „ | 0 | 17 | 6 |
| Female, dark, short and narrow | 0 | 7 | 6 | „ | 0 | 10 | 0 |
| *Blacks:* | | | | | | | |
| Long (special) | 4 | 10 | 0 | „ | 5 | 10 | 0 |
| Long, good | 3 | 0 | 0 | „ | 3 | 10 | 0 |
| Long, fair | 2 | 0 | 0 | „ | 2 | 15 | 0 |
| Long, drabby | 1 | 0 | 0 | „ | 2 | 5 | 0 |
| Medium | 1 | 10 | 0 | „ | 2 | 5 | 0 |
| Short | 0 | 10 | 0 | „ | 0 | 15 | 0 |
| Wiry | 0 | 3 | 0 | „ | 0 | 6 | 0 |
| Floss, long | 1 | 5 | 0 | „ | 1 | 15 | 0 |
| Floss, short | 0 | 9 | 0 | „ | 0 | 14 | 0 |
| *Drabs:* | | | | | | | |
| Long, special | 3 | 10 | 0 | „ | 4 | 5 | 0 |
| Long, good | 2 | 0 | 0 | „ | 2 | 15 | 0 |
| Long, fair | 1 | 5 | 0 | „ | 1 | 15 | 0 |
| Medium | 0 | 17 | 6 | „ | 1 | 10 | 0 |
| Short | 0 | 5 | 0 | „ | 0 | 12 | 6 |
| Wiry | 0 | 2 | 0 | „ | 0 | 5 | 0 |
| Floss, long | 1 | 5 | 0 | „ | 2 | 0 | 0 |
| Floss, short | 0 | 9 | 0 | „ | 0 | 14 | 0 |
| *Spadonas:* | | | | | | | |
| Light (special) | 3 | 0 | 0 | „ | 4 | 10 | 0 |
| Light, fair to good | 1 | 15 | 0 | „ | 2 | 10 | 0 |
| Light, narrow | 0 | 15 | 0 | „ | 1 | 5 | 0 |
| Dark | 1 | 0 | 0 | „ | 2 | 5 | 0 |
| *Chicks* | 0 | 2 | 6 | „ | 0 | 7 | 6 |

The following may be quoted as the approximate current values of unsorted parcels per line:—

| | *Whites.* | | | | | | | *Feminas.* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | £ | s. | d. | | £ | s. | d. | £ | s. | d. | | £ | s. | d. |
| Superior pluckings | 8 | 0 | 0 | to | 9 | 10 | 0 | 6 | 10 | 0 | to | 8 | 0 | 0 |
| Good average lots | 6 | 10 | 0 | „ | 7 | 5 | 0 | 5 | 0 | 0 | „ | 6 | 0 | 0 |
| Poor average lots | 5 | 5 | 0 | „ | 6 | 0 | 0 | 3 | 5 | 0 | „ | 4 | 5 | 0 |
| Common lots, stalky, narrow, and discoloured | 3 | 15 | 0 | „ | 4 | 15 | 0 | 2 | 10 | 0 | „ | 3 | 0 | 0 |

| | *Tails.* | | | | | *Blacks.* | | | | | *Drabs.* | | | | | *Spadonas.* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | s. | d. | | s. | d. | s. | d. | | s. | d. | s. | d. | | s. | d. | s. | d. | | s. | d. |
| Good | 20 | 0 | to | 30 | 0 | 20 | 0 | to | 40 | 0 | 17 | 6 | to | 30 | 0 | 35 | 0 | to | 55 | 0 |
| Average | 12 | 6 | „ | 17 | 6 | 12 | 6 | „ | 15 | 0 | 11 | 0 | „ | 15 | 0 | 27 | 6 | „ | 32 | 6 |
| Poor | 7 | 6 | „ | 10 | 0 | 7 | 6 | „ | 10 | 0 | 7 | 6 | „ | 9 | 0 | 15 | 0 | „ | 22 | 6 |

It will be understood that for special lots these quotations may be exceeded.

*Wool.*—Our market is very firm and new arrivals are eagerly bought up at extreme prices. During the month we sold several clips of short to medium Karroo wool, for which we secured up to 9d., and also up to 8d. for medium Free State. Cross-bred and coarse and coloured wool are in great demand and up to 8¼d. for the former and 7¼d. for the latter has been paid.

We quote the following as current prices:—

| | d. | d. | | d. | d. |
|---|---|---|---|---|---|
| Snow-white, extra superior..... | 22 | to 23 | Grease, short, very wasty....... | 5½ | to 6 |
| „ superior........... | 21 | „ 22 | Cross-bred grease.............. | 7¼ | „ 8 |
| „ good to superior.... | 20 | „ 21 | Cross-bred scoured............. | 14 | „ 16 |
| „ inferior faulty...... | 17 | „ 19 | Grease, coarse and coloured..... | 6¼ | „ 6¾ |
| Grease, super long, well-conditioned, grassveld grown (special clips)............... | 10½ | „ 11½ | Scoured, coarse and coloured.... | 9 | „ 14 |
| Grease, super long, grassveld grown...................... | 9 | „ 9½ | Basuto grease, short............ | 7 | „ 7½ |
| Grease, super long, Karroo grown (special clips)............... | 9½ | „ 10 | O.F.S. grassveld grease, long and well-conditioned (special clips) | 8¼ | „ 9 |
| Grease, super long, Karroo grown | 8 | „ 9 | O.F.S. grassveld grease, long and well-conditioned............. | 7 | „ 7½ |
| Grease, super long, mixed veld.. | 7¼ | „ 8 | O.F.S. grassveld grease, medium grown, light, with little fault | 6¼ | „ 7 |
| Grease, light, faultless, medium, grassveld grown............. | 8¼ | „ 9½ | O.F.S. grassveld grease, short, faulty, and wasty........... | 5½ | „ 6¼ |
| Grease, light, faultless, medium, Karroo grown................ | 7½ | „ 9 | O.F.S. Karroo grown, long and well-conditioned............. | 6¾ | „ 7½ |
| Grease, light, faultless, short, Karroo grown................ | 7 | „ 8 | O.F.S. medium grown, light, with little fault................... | 6 | „ 7 |
| | | | O.F.S. short, faulty, and wasty.. | 5½ | „ 6 |

*Mohair.*—During the month only a moderate business has been done in summer firsts, speculators having sufficient meantime and spinners' representative are only interested at a lower level of values than those ruling the previous month. Negotiations to adjust the sorters' strike in Bradford have led to nothing definite so far, and spinners will not buy except for urgent requirements, as they cannot get mohair sorted. Stocks, however, of summer firsts are held firmly—sellers are convinced of better prices in the near future. Stocks of summer kids are very small, and are gradually being reduced; up to 26d. for choice lots has been paid. The several lots of winter hair that have come to hand have been sold at from 11¼d. to 11½d., and up to 15d. for winter kids.

We quote the following as current prices:—

| | d. | d. | | d. | d. |
|---|---|---|---|---|---|
| Super summer kids............ | 25 | to 26 | Seconds and grey.............. | 8½ | to 9½ |
| Good to super summer kids...... | 22 | „ 24 | Thirds........................ | 6 | „ 7½ |
| Mixed kids................... | 16 | „ 20 | Winter kids, special clips (nominal) | 15 | „ 16 |
| Super firsts................... | 13 | „ 13½ | Winter kids, good ordinary ...... | 14 | „ 14½ |
| Mixed firsts .................. | 12½ | „ 12¾ | Winter mohair................. | 11¼ | „ 11½ |
| Superfine long blue O.F.S. hair.. | 12½ | „ 13½ | Basuto mohair................. | 11¼ | „ 11¾ |
| Mixed O.F.S. mohair (average).. | 11 | „ 12 | Basuto mohair, grey ........... | 8 | „ 10 |
| Mixed O.F.S. mohair, very mixed | 10 | „ 10½ | | | |

*Skins.*—The following are the prices we obtained for the several descriptions this week:—Sheepskins, 6¾d. per lb.; damaged, 5¾d. per lb. Pelts, 4¾d. per lb.; damaged, 3¾d. per lb. Hair Capes, 3s. 2d. each; sundried, 2s. 1d. each; cut, 1s. each; damaged, 8d. each. Coarse wools, 6⅝d. per lb.; damaged, 4½d. per lb. Goat, 13d. per lb.; heavy, 10½d. per lb.; sundried, 11d. per lb.; damaged, 6½d. per lb. Bastards, 11¼d. per lb.; damaged, 4¾d. per lb. Angora, 8⅝d. per lb.; sundried and heavy, 7⅝d. per lb.; shorn, 6¾d. per lb.; damaged, 4¼d. per lb. Johannesburg sheep, 5d.; damaged sheep, 2½d. Pelts, 2¼d. Goat, 10d.; damaged, 5d. Angora, 6½d.; damaged, 2d. per lb.

A large quantity of sheepskins are being received by us in a very seedy condition. Buyers will only purchase these at the price of damaged skins.

*Hides.*—Sundried, 12¾d.; damaged, 11¾d.; salted, 11¾d.; damaged, 10¾d. per lb.

*Horns.*—3½d. each all round.

# The Weather.

By C. STEWART, B.Sc., Chief Meteorologist, Department of Irrigation.

THE mean air temperature over the Union during the month of July was about half a degree above the normal. Over the Transvaal and in the north of the Orange Free State and Natal both day and night temperatures were higher than usual, while in other parts they were lower. Frosts were of frequent occurrence, but of no great intensity. The rainfall was slightly in excess of the normal in Natal, Kaffraria, and over an area comprised of the southern half of the Karroo, and extending to Clanwilliam and Worcester. Over the remainder of the Union there was a deficit. The total year's precipitation (from 1st January) shows an excess over the centre and south-west of the Transvaal, in Natal and Kaffraria, over the eastern portion of the Cape northern border, over the east of the Karroo, and over the south of the Karroo and the adjoining inland districts to the west. Over the remainder of the country there is a shortage, which is most pronounced in the Orange Free State, and in the north-east district and along the south and south-east coasts of the Cape Province.

### WEATHER CHARACTERISTICS OF THE MONTH OF OCTOBER.

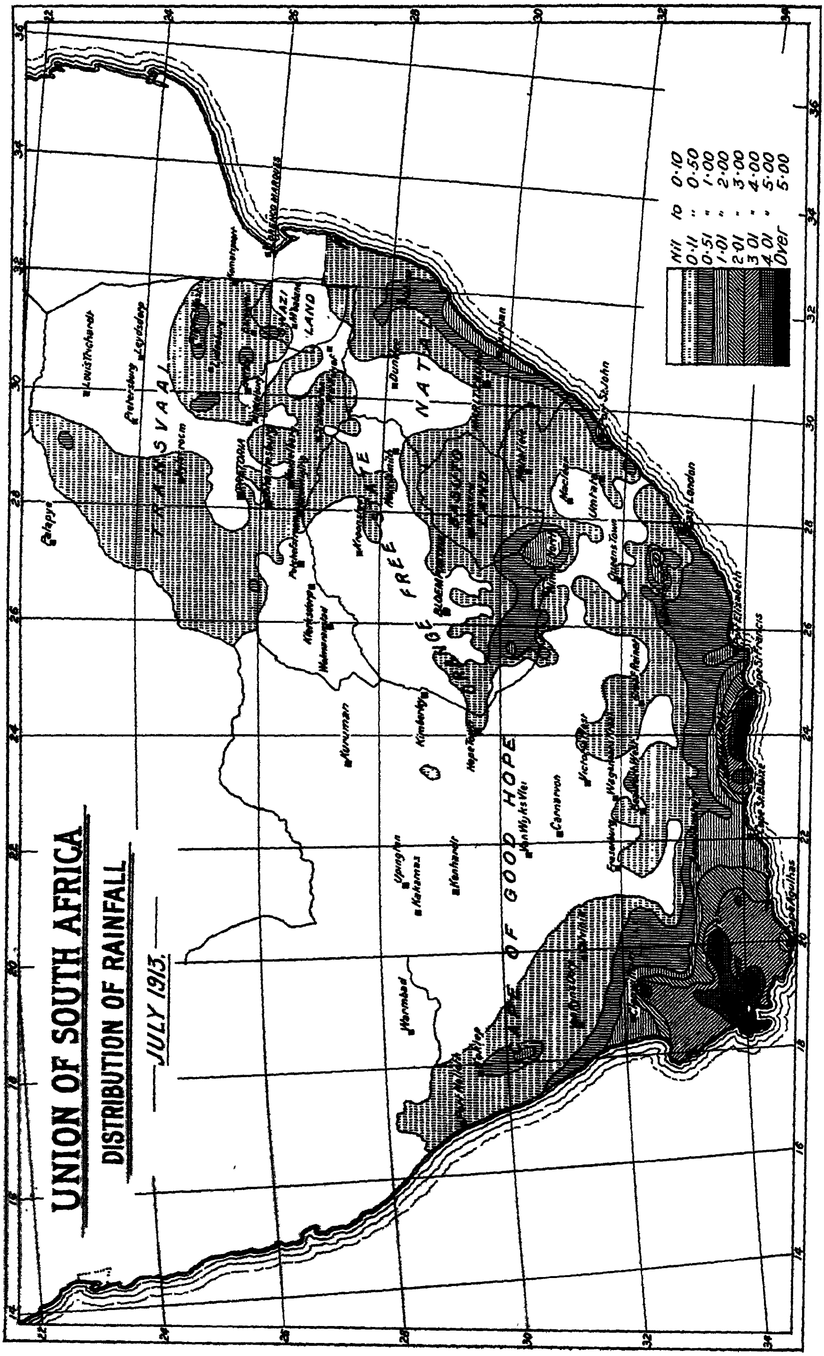
The month of October marks the firm establishment of the inland rainy season and a general increase in the intensity of precipitation throughout the Union. In the south-west of the Cape and over the Peninsula, however, the tendency is in the opposite direction, while over the southern and western coastal districts there should be but little change from the preceding month. The heaviest rainfall should now be experienced in Zululand, Swaziland, and Natal, where the normals are about 3·5 inches. The Cape Peninsula may expect about 3·0 inches; Basutoland, the Transvaal eastern border, and the south-eastern coastal districts 2·5 inches; the south coast and south-west of the Cape Province 2·0 inches; the Transvaal high veld, Orange Free State, and the east central Karroo 1·5 inches; and the remainder of the Union less than 1·0 inch. A mean monthly air temperature of 68 degrees may be anticipated in Natal, and 67 degrees will probably be reached in the eastern Transvaal and the northern border of the Cape Province. The normal in Kaffraria is about 61 degrees, in the Cape coastal districts 62 degrees, on the Peninsula 60 degrees, and in the south-west 61 degrees. On the high veld the mean temperature should range from 63 degrees in the Transvaal and Orange Free State to 60 degrees in Basutoland and on the northern Karroo. Frosts are unusual. Of the total possible number of hours of bright sunshine about 80 per cent. should be enjoyed over the northern border of the Cape Province, 58 per cent. in the south-eastern districts, 61 per cent. on the Peninsula, and 65 per. cent. in the Transvaal.

OBSERVATIONS OF TEMPERATURES (FROM SELF-REGISTERING THERMOMETERS IN THERMOMETER SCREENS)—JULY, 1913.

| PLACE. | OBSERVER. | MONTH—JULY, 1913. | | | Normal Monthly Temperature | Difference from Normal. | EXTREMES. | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean Max. | Mean Min. | Monthly Temperature | | | Highest. | Date. | Lowest. | Date. |
| | | ° | ° | ° | ° | ° | ° | | ° | |
| *Transvaal*—Louis Trichardt ... | S.-Sergt. J. C. N. Clark | 74·7 | 44·6 | 59·6 | 55·7 | +3·9 | 86·0 | 29th | 35·0 | 17th & 18th. |
| Pietersburg ... ... | W. Frankleyne ... | 74·2 | 39·0 | 56·6 | 52·6 | +4·0 | 84·0 | 29th | 32·0 | 15th & 16th. |
| Zeerust ... ... | H. Dietrich, J.P. ... | 70·9 | 34·2 | 52·6 | 50·3 | +2·3 | 81·0 | 29th | 25·4 | 8th. |
| Pretoria (Arcadia) ... | J. Lyall Soutter ... | 71·6 | 35·2 | 53·4 | 51·7 | +1·7 | 81·3 | 30th | 27·3 | 18th. |
| Belfast ... ... | G. J. Imrie ... ... | 63·6 | 29·5 | 46·5 | 44·7 | +1·8 | 71·0 | 30th | 22·0 | 19th. |
| Mbabane (Swaziland). | A. C. Hulett ... | 70·7 | 46·1 | 58·8 | 55·4 | +3·4 | 82·0 | 29th | 35·0 | 16th. |
| Johannesburg (Obser.) | Staff ... ... | 63·5 | 44·2 | 53·9 | 50·4 | +3·5 | 72·7 | 29th | 31·2 | 15th. |
| Potchefstroom ... | J. R. Stenning ... | 68·2 | 34·4 | 51·3 | 49·0 | +2·3 | 80·2 | 29th | 23·5 | 24th. |
| Komatipoort ... ... | H. J. Evans ... | 82·2 | 49·9 | 66·1 | 62·6 | +3·4 | 96·0 | 29th | 40·0 | 18th. |
| *Free State*—Bloemfontein ... ... | J. Arndt ... ... | 62·2 | 32·1 | 47·1 | 47·6 | —0·5 | 72·0 | 31st | 24·7 | 10th. |
| Harrismith ... ... | J. B. Patterson ... | 61·9 | 36·0 | 48·9 | 46·4 | +2·5 | 68·8 | 29th | 24·0 | 15th. |
| *Natal*—Durban ... ... | Capt. Black ... | 64·4 | 54·3 | 59·3 | — | — | 70·0 | 29th | 48·0 | 17th. |
| Maritzburg ... ... | Govt. Asylum ... | 74·5 | 38·7 | 56·6 | 58·6 | —2·0 | 86·0 | 27th | 30·0 | 11th. |
| Dundee ... ... | T. Kenny ... ... | 72·2 | 37·4 | 54·8 | 54·3 | +0·5 | 82·0 | 29th | 28·0 | 7th. |
| Hlabisa ... ... | J. Swarbrick ... | 79·0 | 55·0 | 67·0 | 62·8 | +4·4 | 85·0 | 28th | 50·0 | 16th. |
| *Cape*—Kuruman ... ... | G. Bean ... ... | 70·0 | 29·0 | 49·5 | — | — | 78·0 | 31st | 19·0 | 8th. |
| Aliwal North ... ... | A. Brown ... ... | 64·2 | 27·1 | 45·7 | 46·4 | —0·7 | 75·0 | 31st | 21·0 | 10th. |
| Kokstad ... ... | H. D. Coyte ... | 65·1 | 31·3 | 48·4 | 48·9 | —0·5 | 75·0 | 28th | 22·0 | 16th. |
| Clanwilliam ... ... | W. J. Downes ... | 65·5 | 42·2 | 53·3 | 54·2 | —0·9 | 83·0 | 19th | 35·0 | 7th. |
| Queenstown ... ... | A. Brown ... ... | 63·4 | 32·9 | 48·2 | 51·4 | —3·2 | 73·0 | 13th, 27th, and 28th | 23·0 | 10th. |
| East London ... ... | M. C. Grogan ... | 67·5 | 47·3 | 57·4 | 60·0 | —2·6 | 75·0 | 9th & 20th | 41·0 | 10th & 11th. |
| Capetown (Observatory) | The Staff ... ... | 60·3 | 46·2 | 53·2 | 54·8 | —1·6 | 68·3 | 18th | 36·3 | 9th. |
| Wynberg ... ... | Sister Mary Imelda | 61·7 | 44·0 | 52·8 | 56·0 | —3·2 | 69·0 | 19th | 36·2 | 11th. |
| Mossel Bay ... ... | A. Draper ... ... | 63·1 | 44·5 | 53·8 | 57·9 | —4·1 | 81·0 | 19th | 37·0 | 12th. |
| Port Elizabeth ... | P. E. Morgan ... | 66·3 | 47·5 | 56·9 | 58·8 | —1·9 | 79·0 | 18th & 19th | 41·0 | 10th. |

RAINFALL RETURN FOR JULY, 1913.

| PLACE. | OBSERVER. | MONTH. July, 1913. | MONTH. Normal. | MONTH. Difference from Normal. | YEAR. From 1st Jan., 1913. | YEAR. Normal. | YEAR. Difference from Normal. |
|---|---|---|---|---|---|---|---|
| *Transvaal—* | | ins. | ins. | ins. | ins. | ins. | ins. |
| Komatipoort ... | H. J. Evans ... | 0·26 | 0·26 | ±0·00 | 15·22 | 16·46 | —1·24 |
| Christiana ... | S. W. Davis ... | 0·00 | 0·13 | —0·13 | 14·53 | 12·73 | +1·80 |
| Pilgrims Rest ... | E. Elphinstone ... | 0·30 | 0·34 | —0·04 | 25·23 | 26·40 | —1·17 |
| Belfast ... ... | The Forester ... | 0·06 | 0·04 | +0·02 | 17·47 | 16·62 | +0·85 |
| Zeerust ... ... | H. Dietrich ... | 0·08 | 0·14 | —0·06 | 13·98 | 15·52 | —1·54 |
| Pretoria (Arcadia) | J. Lyall Soutter... | 0·02 | 0·08 | —0·06 | 17·70 | 17·03 | +0·67 |
| Standerton ... | A. von Backstrom | 0·34 | 0·23 | +0·11 | 16·06 | 16·80 | —0·74 |
| Pietpotgietersrust | S. A. Police ... | 0·01 | 0·04 | —0·03 | 17·28 | 13·71 | +3·57 |
| Johannesburg ... | Observatory Staff | 0·14 | 0·16 | —0·02 | 12·64 | 16·90 | —4·26 |
| Louis Trichardt ... | Sgt. J. C. M. Clark | 0·09 | 0·41 | —0·32 | 18·25 | 18·40 | +0·15 |
| Pietersburg ... | W. Frankleyne ... | 0·05 | 0·08 | —0·03 | 14·25 | 11·37 | +2·88 |
| Rooiberg ... ... | N. H. Munro ... | 0·01 | 0·11 | —0·10 | 11·09 | 14·00 | —2·91 |
| *Swaziland—* | | | | | | | |
| Mbabane... ... | Swaziland Police | 0·13 | 0·62 | —0·49 | 28·20 | 28·66 | —0·46 |
| *Natal—* | | | | | | | |
| Maritzburg ... | Govt. Asylum ... | 0·14 | 0·16 | —0·02 | 31·74 | 16·59 | +15·15 |
| Dundee ... ... | T. Kenny ... | 0·40 | 0·14 | +0·26 | 18·59 | 18·28 | +0·31 |
| Hlabisa ... ... | J. Swarbrick ... | 0·54 | 0·38 | +0·16 | 36·61 | 21·65 | +14·96 |
| Port Shepstone ... | A. B. Cox ... | 0·58 | — | — | 30·71 | — | — |
| Durban ... ... | Capt. Black ... | 1·86 | 0·77 | +1·09 | 44·49 | 20·26 | +24·23 |
| *Cape—* | | | | | | | |
| Mafeking ... | W. Hawkins . | 0·00 | 0·39 | —0·39 | 12·46 | 13·08 | —0·62 |
| Kenhardt ... | A. E. Bowker ... | 0·00 | 0·13 | —0·13 | 2·21 | 4·33 | —2·12 |
| Prieska ... ... | M. Drummer ... | 0·00 | 0·10 | —0·10 | 7·94 | 7·53 | +0·41 |
| Hopetown ... | C. B. Scott ... | 0·12 | 0·27 | —0·15 | 8·30 | 9·67 | —1·37 |
| Clanwilliam ... | W. J. Downes ... | 1·31 | 1·10 | +0·21 | 5·62 | 5·54 | +0·08 |
| Van Rhynsdorp ... | T. J. Shaw ... | 0·80 | 0·88 | —0·08 | 3·63 | 4·17 | —0·54 |
| Britstown ... | — ... | 0·03 | 0·12 | —0·09 | 8·65 | 8·10 | +0·55 |
| Carnarvon ... | J. Sullivan ... | 0·04 | 0·15 | —0·11 | 5·95 | 6·40 | —0·41 |
| Murraysburg ... | A. J. Cameron ... | 0·16 | 0·32 | —0·16 | 9·27 | 8·20 | +1·07 |
| Philippstown ... | P.W. van Ingen-Kal | 0·00 | 0·31 | —0·31 | 9·57 | 10·01 | —0·44 |
| Hanover ... ... | B. Collett ... | 0·00 | 0·41 | —0·41 | 7·90 | 10·48 | —2·58 |
| Aliwal North ... | J. P. Casteling ... | 0·00 | 0·54 | —0·54 | 10·24 | 16·35 | —6·11 |
| Queenstown ... | H. Holley ... | 0·07 | 0·71 | —0·64 | 14·78 | 15·31 | —0·53 |
| Kokstad ... | H. D. Coyte ... | 0·27 | 0·21 | +0·06 | 19·38 | 15·05 | +4·33 |
| Piquetberg ... | Gaoler ... | 2·44 | 2·80 | —0·36 | — | 12·77 | — |
| Worcester ... | W. B. Sutton ... | 3·69 | 1·30 | +2·39 | 7·53 | 6·56 | +0·97 |
| Capetown Observ. | The Staff... ... | 4·01 | 4·12 | —0·11 | 13·51 | 17·07 | —3·56 |
| Wynberg ... | Sister Mary Imelda | 6·85 | 6·99 | —0·14 | 23·67 | 26·09 | —2·42 |
| Sutherland ... | — ... | 0·83 | 0·74 | +0·09 | 5·30 | 6·71 | —1·41 |
| Swellendam ... | H. Montgomery... | 4·15 | 2·09 | —2·06 | 12·43 | 18·93 | —6·50 |
| Mossel Bay ... | G. Draper ... | 1·43 | 1·18 | —0·25 | 7·48 | 10·09 | —2·61 |
| Beaufort West ... | J. E. Stevens ... | 0·57 | 0·21 | +0·36 | 8·01 | 5·45 | +2·56 |
| Uniondale ... | E. J. Stewart ... | 1·61 | 1·07 | +0·54 | 9·54 | 8·26 | +1·28 |
| Knysna ... ... | C. Wilding ... | 3·12 | 2·19 | +0·93 | 12·18 | 15·21 | —3·03 |
| Graaff-Reinet ... | J. A. Simpson ... | 0·43 | 0·52 | —0·09 | 11·59 | 9·87 | +1·72 |
| Steytlerville ... | P. R. de Wet ... | 0·63 | 0·14 | +0·49 | 11·17 | 5·14 | +6·03 |
| Port Elizabeth ... | P. E. Morgan ... | 1·43 | 1·60 | —0·17 | 10·69 | 10·74 | —0·05 |
| East London ... | M. C. Grogan ... | 1·70 | 1·13 | —0·57 | 21·56 | 13·54 | —8·02 |
| Kimberley ... | G. Neville ... | 0·04 | 0·34 | —0·30 | 12·14 | 11·85 | +0·29 |
| Griquatown ... | E. Hanstein ... | 0·21 | 0·16 | +0·05 | 12·71 | 10·46 | +2·25 |
| *Orange Free State —* | | | | | | | |
| Harrismith ... | J. B. Patterson ... | 0·04 | 0·25 | —0·21 | 12·36 | 16·10 | —3·74 |
| Bloemfontein ... | J. Arndt ... ... | 0·05 | 0·32 | —0·27 | 11·18 | 15·00 | —3·82 |


UNION OF SOUTH AFRICA
DISTRIBUTION OF RAINFALL
JULY 1913.
Nil to 0·10
0·11 " 0·50
0·51 " 1·00
1·01 " 2·00
2·01 " 3·00
3·01 " 4·00
4·01 " 5·00
Over 5·00
TRANSVAAL
ORANGE FREE STATE
NATAL
BASUTOLAND
CAPE OF GOOD HOPE

# Current Market Rates of Agricultural Produce and Stock.

The following TABLE OF CURRENT MARKET RATES OF AGRICULTURAL PRODUCE AND LIVE STOCK on Saturday, 30th August, 1913, ruling at the several Centres named, is published for general *information.*

| Centre. | A. Wheat per 100 lb. | B. Wheat Flour per 100 lb. | C. Boer Meal per 100 lb. | D. Mealies per 100 lb. | E. Mealie Meal per 100 lb. | F. Barley per 100 lb. | G. Oats per 100 lb. | H. Oat-hay per 100 lb. | J. Lucerne Hay per 100 lb. | K. Potatoes per 100 lb. | L. Tobacco (Boer Roll) per lb. | M. Beef per lb. | N. Mutton per lb. | O. Fresh Butter per lb. | P. Eggs per dozen. | Q. Cattle (Slaughter). | R. Sheep (Slaughter). | S. Pigs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Cape Province:* | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | £ s. d. | s. d. | £ s. d. |
| Aliwal North ... | 12 6 | 21 0 | 16 6 | 9 6 | 11 6 | 11 0 | 11 0 | 7 6 | 3 9 | 9 0 | 1 3 | 0 6 | 0 6 | 1 3 | 1 0 | 12 10 0 | 15 0 | *2 10 0 |
| Beaufort West ... | 13 0 | 17 6 | 12 6 | 6 6 | 8 0 | 11 0 | 7 6 | 4 6 | 6 0 | 12 0 | 0 9† | 0 4½ | ‡0 5½ | 1 5 | 1 9 | 13 0 0 | 14 0 | 4 10 0 |
| Capetown ... | 6 9 | — | — | — | — | 8 0 | 7 0 | 5 0 | 8 0 | 12 0 | 0 6‖ | — | — | 1 3 | 1 2 | — | — | — |
| East London ... | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Grahamstown ... | 12 0 | — | — | 7 9 | — | 8 4 | 8 6 | 7 4 | 6 0 | 13 0 | 0 6½ | 0 6 | 0 6 | 2 0 | 1 0 | — | — | — |
| Kimberley ... | 12 0 | 15 6 | 15 0 | 11 6 | 7 3 | 9 0 | 9 6 | 5 6 | 7 6 | 13 0 | 0 6 | 0 5 | 0 5½ | 1 6 | 1 3 | 12 10 0 | 14 0 | 3½d. p. lb. |
| Kingwilliamstown | 14 0 | 18 6 | 14 0 | 6 6 | 14 0 | 10 0 | 9 0 | 7 0 | 7 0 | 12 0 | 0 8 | 0 5 | 0 5 | 1 9 | 0 9 | 16 0 0 | 28 0 | 3d. l.wt. |
| Port Elizabeth ... | 10 6 | — | — | 7 3 | — | 8 0 | 8 0 | 6 6 | — | 13 6 | — | 0 6 | 0 6 | 2 0 | 1 0 | — | — | 2 5 0 |
| Queenstown ... | 4 6 | 16 6 | 13 6 | 7 0 | 10 0 | — | 9 6 | — | 6 6 | 10 6 | 0 10 | — | 0 4 | 2 0 | 1 3 | — | — | — |
| *Natal:* | | | | | | | | | | | | | | | | | | |
| Durban ... | — | — | — | 6 0 | — | — | — | — | — | 10 0 | — | — | 0 5 | 1 6 | 1 3 | — | — | — |
| Pietermaritzburg | — | — | — | 5 9 | — | 12 0 | 10 0 | 7 0 | 6 6 | 10 6 | 0 4 | 0 5 | 0 6 | 1 7 | 1 0 | — | — | — |
| *Transvaal:* | | | | | | | | | | | | | | | | | | |
| Pretoria ... | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Johannesburg ... | 12 9 | — | 14 3§ | 5 6 | 5 9 | 9 4 | 9 4 | 6 6 | 6 0 | 10 8 | 0 1½ | — | — | 1 4 | 1 1 | — | — | — |
| *Orange Free State:* | | | | | | | | | | | | | | | | | | |
| Bloemfontein ... | 12 0 | — | 15 0 | 6 0 | 9 0 | 9 6 | 8 6 | 6 0 | — | 6 0 | 10 6 | 0 6 | 0 6 | — | 1 6 | — | — | — |
| Harrismith ... | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

* Average, £2 to £3. † Average, 6d. to 1s. ‡ Average, 4d. to 6d. § Sifted. ‖ Average 4d. to 8d.

# Farm Employment.

**NOTE.**—*This section is open to persons desiring to obtain employment on the land, and to farmers who require farm assistants. Notices are inserted in several succeeding issues; and advertisers are requested to advise the Editor as soon as their requirements are filled in order that their notices may be deleted.*

SITUATIONS WANTED.

Young man (South African), aged 20, seeks employment on a South African farm. Has a knowledge of farming in general, cattle, sheep, lucerne, butter-making, etc. Good testimonials. —S. GREEN, c/o A. Schutz, Nelspruit, Transvaal. [8]

Employment wanted by applicant, aged 24 years, on a farm, as manager or general assistant. Good references.—F. WOODHEAD, "Cibowie," Avenue le Sueur, Sea Point, C.P. [8]

Applicant, 26 years of age, with 7 years' experience both in stock and agriculture farming in the Orange Free State, desires situation as farm manager. Speaks Dutch, English, and Sesuto fluently.—J. P. CELLIERS, Malima Private Bag, Kestell, O.F.S. [8]

Young Hollander, 24 years of age, seeks employment in return for board and lodging. Good testimonials. Speaks English.—A. G. LAMBERT, Box 12, Bethal. [8]

German, aged 23, wishes to obtain employment on a farm for the purpose of acquiring a knowledge of the farming methods employed in the Union. Has had good experience in horses, cattle, sheep, dairying, and agriculture generally. Has qualified in veterinary science. Is prepared to work for a small wage or to make other arrangements.—MAX FIRNSTEIN, Box 1216, Capetown. [8]

Applicant, with eight years' practical and successful experience in Western Australia in the opening up of virgin forest and scrub country for the purpose of growing cereals, seeks employment either as assistant or manager.—F. R. PARAMOR, Nimberrin, via Baandee, Western Australia. [8]

Applicant, healthy, steady, and not afraid of work, 27 years of age, unmarried, seeks employment on farm in Orange Free State or Transvaal. Served six years apprenticeship on Western Province farm. Fair knowledge of general farming; ostriches a speciality. Would be willing to manage farm on salary, or share and salary basis. Speaks Dutch and English.—J. BRAND, c/o Chief Inspector of Grain, Department of Agriculture, Pretoria. [8]

Position wanted on farm by youth 19 years of age. Four years' experience of mixed farming. Knowledge of Dutch and Kaffir.—L. NOBLE, 59 Pretoria Street, Troyeville, Johannesburg. [9]

Applicant, experienced and hard worker, age 22, wants good situation as manager of farm, or will run farm on shares. Two years' 2nd class diploma at College of Agriculture, Elsenberg; born in South Africa; accustomed to live-stock farming from birth, short course at Potchefstroom in July, 1913; will run suction gas and oil engines; experience in cattle, incubators, dairy, ostriches, sheep, poultry, crops, and fruit (vines, pears, apples), etc. —EUSTACE A. CROLL-JONES, Ravensworth, Claremont, Capetown. [9]

Applicant, English, aged 46, desires post on a fruit farm. Thoroughly understands fruit culture, having had many years of practical experience in California; is proficient in planting, pruning, and the general care of fruit trees, both deciduous and citrus. Terms to be arranged.—CHARLES E. REUSS, 5 Florence Villas, Orange Street, Capetown. [9]

Young Englishman, just arrived, desires post on farm or plantation. Excellent references, and prepared to work.—J. E ASHMEAD, Rocklands, Seapoint, Capetown. [9]

Applicant, aged 40, with knowledge of tobacco, cotton, citrus-growing, also general farming, desires employment. Salary required with percentage of crops. References.—C. A. FAIRLIE, 46 Esselen Street, Johannesburg. [9]

Applicant, age 28, desires employment on a farm. No experience in farming. Would like, if possible, a salary, and in return keep accounts, etc.—JAMES GOODALL, Rocklands, Beach Road, Sea Point, Capetown. [9]

Applicant, South African, age 20, seeks employment on farm. Experience in agriculture, stock, fruit-growing, and grafting. Willing to do any kind of work. Testimonials. Understands English and Dutch.—D. J. GROENEWALD, Rietfontein No. 15, P.O. Witkoppies, Pretoria. [9]

Applicant, age 38, married, with six children, two eldest boys 14 and 15, desires position on farm or estate. Experienced in carpentry, wire work, fencing, upkeep of telephones and erection of lines. Good kit of tools. Used to supervising Kaffir and Indian labour. Twelve years' successful experience in poultry rearing.—C.A.T., 276 Bulwer Road, Durban. [9]

## SITUATIONS VACANT.

Miss A. E. Pullinger, well known in the bee-keeping world, has a vacancy for one pupil for the approaching active season. Terms to be arranged.—Address, Freshwater Apiary, Berg River Station, C.P. [7]

Man with first-class stock and agricultural farm wants partner with capital of £1500 to invest in certain class of breeding stock, not subject to any disease prevalent in South Africa. No costs attached to breeding this particular class of animals. Return of at least 75 per cent. per annum of invested money guaranteed.—Apply C.L., 14 Pretorius Street, Pretoria. [7]

Experienced man wanted to take over large orchard, chiefly apples, either on salary or share.—"ORCHARD," Clocolan, O.F.S. [7]

Farm assistant wanted—one experienced in thrashing and shelling machinery.—"OUTFIT," Clocolan, O.F.S. [7]

Wanted on a farm on Crocodile River, District Pretoria, young South African with own span of oxen, in return for half of crops. Can also make money by working for owner. Terms as regards wages, time, grazing, etc., to be arranged.—C.M., c/o *Agricultural Journal*, Pretoria. [8]

Strong girl or woman wanted to assist on poultry farm, either as learner or help. Terms to be arranged.—E.W., c/o *Agricultural Journal*, Pretoria. [8]

Wanted on a farm suitable for cultivation of tobacco and cotton, and with very fertile soil for any cereal, a man who will cultivate the land on his own account.—GEO. J. TRICHARDT, Mahobieskraal, P.O. Tussenkomst, Rustenburg. [8]

Qualified English farmer has openings for a few pupils; terms (including board) moderate.—ALLAN BAGNLEY, B.Sc., F.I.C., P.O. Zuurfontein, Transvaal. [9]

The South African National Union have a number of applications from farmers in different parts of the Union who offer to take pupils on the condition that they are willing to serve a term of apprenticeship in exchange for board and lodging and instruction, with the prospect of a wage or interest afterwards. Young men who will go on to the land on these terms are invited to communicate with the Secretary, 20 Cullinan Buildings, Johannesburg. [9]

# Outbreaks of Animal Diseases.

THE following outbreaks of scheduled infectious and contagious animal diseases have occurred in the areas specified during the month ended 31st August 1913.

C. E. GRAY,
*Principal Veterinary Surgeon (Union).*

## TRANSVAAL.

| DISEASE. | DISTRICT. | AREA OR NAME OF FARM. | Number of Deaths. | Number of Animals Affected. | Number of In-contacts. | Number of Animals Tested. | Number of Animals Reacted and Destroyed. | Number of Doubtful Reactors to be Retested. |
|---|---|---|---|---|---|---|---|---|
| East Coast Fever | Wakkerstroom ... | 47 Schoon Street, Volksrust ... ... ... ... | 1 | — | about 300 | — | — | — |
| | Piet Retief ... ... | Welgekozen No. 75 ... ... ... ... ... | — | — | — | — | — | — |
| | Zoutpansberg ... | Letaba Drift No. 2333 ... ... ... ... ... | 8 | 5 | 32 | — | — | — |
| Anthrax ... | Marico ... ... | Driefontein No. 36 ... ... ... ... ... | 1 | — | 425 | — | — | — |
| | Potchefstroom ... | Haaskraal No. 101 ... ... ... ... ... | 1 | — | 59 | — | — | — |
| | " ... | Weltevreden No. 577 ... ... ... ... ... | 1 | — | 60 | — | — | — |
| | Witwatersrand ... | Welgedacht No. 27 ... ... ... ... ... | 1 | — | 44 | — | — | — |
| | " ... | Elsburg, Germiston ... ... ... ... ... | 1 | — | 16 | — | — | — |
| | Potchefstroom ... | Vaalkop Town Lands ... ... ... ... ... | 1 | — | 60 | — | — | — |
| | Witwatersrand ... | Klippoortje No. 2 ... ... ... ... ... ... | 1 | — | 6 | — | — | — |
| | Krugersdorp ... | Witpoortje No. 44 ... ... ... ... ... ... | 2 | — | 32 | — | — | — |
| | " ... | Roodepoort ... ... ... ... ... ... ... | 1 | — | — | — | — | — |
| | Potchefstroom ... | Ventersdorp ... ... ... ... ... ... | 1 | — | — | — | — | — |
| | Witwatersrand ... | Rietfontein No. 9 ... ... ... ... ... ... | 1 | — | 26 | — | — | — |
| | " ... | Elsburg, Germiston ... ... ... ... ... | 1 | — | — | — | — | — |
| | " ... | Alberton ... ... ... ... ... ... ... | 2 | — | — | — | — | — |
| Mange in Equines | Krugersdorp ... | Municipality (Krugersdorp) ... ... ... ... | — | 2 | 30 | — | — | — |
| | Pretoria ... ... | Combined Training Depot ... ... ... ... | — | 1 | — | — | — | — |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Tuberculosis ... | Krugersdorp ... | Kromdraai ... ... ... ... ... ... ... | — | — | — | 36 | 3 | — |
| | Witwatersrand ... | Orphanage, Langlaagte ... ... ... ... ... | 1 | — | 60 | — | — | — |
| Swine Fever ... | Witwatersrand ... | Rietfontein No. 9 ... ... ... ... ... ... | 3 | — | about 353 | — | — | — |
| | „ ... | Stands 260 and 261, Johannesburg ... ... ... | 1 | — | — | — | — | — |
| | „ ... | Elandsfontein No. 6 ... ... ... ... ... | 30 or more | — | about 161 | — | — | — |
| | „ ... | Brickworks, Auckland Park .. ... ... ... | 2 ? | — | 13 | — | — | — |
| | „ ... | Braamfontein No. 11* ... ... ... ... ... | 22 | — | 143 | — | — | — |
| | „ ... | Stand, Rouxville, Johannesburg* ... ... ... | 2 | 20 | 59 | — | — | — |

* Inadvertently omitted from July return; outbreaks occurred in July.

Districts in Transvaal in which East Coast Fever is prevalent :—Zoutpansberg, Carolina, Barberton, Piet Retief, Rustenburg, Lydenburg, and Pretoria.

CAPE PROVINCE

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Anthrax ... | Albany ... ... | Hopefontein, Salem ... ... ... ... ... ... | 2 | — | Unkn. | — | — | — |
| | Barkly West ... | N. W. No. 41, Boetsup ... ... ... ... ... | 6 | — | „ | — | — | — |
| | „ ... | Delpoort's Hope ... ... ... ... ... ... | 1 | — | „ | — | — | — |
| | Komgha ... ... | Farm Sec. 21 xiii/38 ... ... ... ... ... | 1 | — | 19 | — | — | — |
| | „ ... ... | Farm Sec. 52 xiii/9 and 10 ... ... ... ... | 1 | — | 10 | — | — | — |
| | Mafeking ... ... | Commonage ... ... ... ... ... ... ... | 1 | — | 40 | — | — | — |
| | „ ... ... | Quaggashoek . ... ... ... ... ... ... | 3 | — | 503 | — | — | — |
| | Vryburg ... ... | Dryharts, Verona ... ... ... ... ... ... | 1 | — | 140 | — | — | — |
| Glanders ... | East London ... | Tennyson Street ... ... ... ... ... ... | — | — | — | 16 | 1 | — |
| Mange in Equines | Albany ... ... | Vlakwater, Carlisle ... ... ... ... ... ... | — | 6 | — | — | — | — |
| | Cape ... ... | Capetown ... ... ... ... ... ... ... | — | 1 | — | — | — | — |
| | Humansdorp ... | Hankey ... ... ... ... ... ... ... | — | 1 | — | — | — | — |
| | Malmesbury ... | Vredenburg ... ... ... ... ... ... | — | 4 | — | — | — | — |
| | „ ... ... | Brakfontein ... ... ... ... ... ... | — | 2 | — | — | — | — |
| | Paarl ... ... | Lower Paarl ... ... ... ... ... ... | — | 2 | — | — | — | — |
| | Uitenhage ... ... | Loerie River ... ... ... ... ... ... | — | 1 | — | — | — | — |
| Tuberculosis ... | Cape ... ... | Various ... ... ... ... ... ... ... ... | — | — | — | 334 | 20 | 1 |
| | Malmesbury ... | „ ... ... ... ... ... ... ... ... | — | — | — | 57 | 1 | Nil |
| | Paarl ... ... | „ ... ... ... ... ... ... ... ... | — | — | — | 9 | 1 | Nil |
| | Stellenbosch ... | „ ... ... ... ... ... ... ... ... | — | — | — | 41 | 3 | Nil |

Districts of the Cape Province in which East Coast Fever is prevalent :—East London, Kingwilliamstown, and Komgha.

## NATAL.

| Disease. | District. | Area or Name of Farm. | Number of Deaths. | Number of Animals Affected. | Number of In-contacts. | Number of Animals Tested. | Number of Animals Reacted and Destroyed. | Number of Doubtful Reactors to be Retested. |
|---|---|---|---|---|---|---|---|---|
| East Coast Fever | Camperdown ... | Clifton ... | 1 | — | 109 | — | — | — |
| | Ixopo ... | B.P. Uckuvana ... | 3 | — | 41 | — | — | — |
| | Ladysmith ... | Lower Arcadie ... | 3 | — | 169 | — | — | — |
| | Vryheid ... | Tintas Drift ... | 1 | — | 70 | — | — | — |
| | Mtunzini ... | Eccleston's Farm ... | — | — | — | — | — | — |
| | Weenen ... | Gretna Green ... | 2 | — | 11 | — | — | — |
| Anthrax ... | Lions River ... | St. Ives ... | — | — | — | — | — | — |
| Mange in Equines | Ixopo ... | Lot 4, Xualo ... | — | — | 2 | — | — | — |
| | " ... | A.B.... ... | — | — | 2 | — | — | — |
| | Polela ... | Location No. 2 ... | — | — | 4 | — | — | — |
| | " ... | Carisbrook ... | — | — | 1 | — | — | — |
| Epizootic Lymphangitis | Lower Tugela ... | Umhlali ... | — | — | 16 | — | — | — |
| Glanders ... | Durban ... | Bulwer Road ... | — | — | 2 | — | 1 | — |
| | Newcastle ... | Doornpoort... ... | — | — | 30 | 30 | 1 | — |
| Tuberculosis ... | Pietermaritzburg ... | Victoria Road (discovered at Abattoir) ... | — | — | 30 | — | 1 | — |

With the exception of Lower Tugela, every Magisterial Division in Natal is infected with East Coast Fever.

## TRANSKEI.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| East Coast Fever | Mount Frere | Ngqetus Location | 2 | — | 76 | — | — | — |
| | „ | Tsibeyanas Location | 2 | — | 159 | — | — | — |
| | Kentani | Mandendes and Nzimagqas Locations | — | — | — | — | — | — |
| | Butterworth | Nguzas and Genmes Locations | — | — | — | — | — | — |
| | Nqamakwe | Madumas Location | — | — | — | — | — | — |
| | Tabankulu | Ndhebes Location | — | — | — | — | — | — |
| | Qumbu | Mtengwanes Location | 2 | — | 49 | — | — | — |
| | „ | Majekes Location | — | — | — | — | — | — |
| | Tsomo | Commonage and Mission | 2 | — | 278 | — | — | — |
| Anthrax | Kentani | Velebanis, Dalvenis, and Simangas Locations | — | — | — | — | — | — |
| Lung-sickness | Mqanduli | Pakamiles Location | 1 | — | 34* | — | 4 | — |
| | „ | Dinizulus Location | 2 | — | 44* | — | 5 | — |
| | Umtata | Sanganis Location | — | — | 211* | — | 2 | — |
| | Elliotdale | Stephanisis Location | 1 | — | 50* | — | 2 | — |
| | Engcobo | Commonage | — | — | 34* | — | 2 | — |
| Mange in Equines | Kokstad | — | — | 2 | — | — | — | — |
| | Mqanduli | Commonage | — | 1 | — | — | — | — |

Districts in Transkei free from East Coast Fever are :—Mount Fletcher, Matatiele, and Xalanga. * Inoculated.

## ORANGE FREE STATE.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Glanders | Wepener | Eldorado | 1 | — | 2 | 2 | — | — |
| | Bethlehem | Dundalk | 1 | — | — | 10 | 1 | — |
| Anthrax | Fauresmith | Honingberg | 1 | — | 163 | — | — | — |
| | Hoopstad | Grootfontein No. 388 | 1 | — | Unkn. | — | — | — |
| Mange in Equines | Ficksburg | Clocolan Town, Erf No. 491 | — | 3 | Unkn. | — | — | — |

# Importation of Live Stock.

RETURN showing particulars of certain Pure-Bred Live Stock recently imported into the Union of South Africa.

| Stud-book No. or Name. | Breed and Stud-book in which Registered. | Sex. | Country of Origin. | Importer's Name and Address. |
|---|---|---|---|---|
| HORSES: | | | | |
| "Mandham Boy," No. 3650 | Suffolk ... ... ... ... ... ... ... | Stallion | U.K. | Fred. Ringer, Heilbron, O.F.S. (24/7/13). |
| No. 47 ... ... ... | Thoroughbred.—English Stud-book, vol. 21, page 30 ... | Mare | England | Farrar Bros., P.O. Box 305, Jo'burg (22/7/13). |
| No. 40 ... ... ... | " " " " " 654... | Stallion | " | " " " |
| CATTLE: | | | | |
| "Woodcote Brand," No. 2265 | British Holstein ... ... ... ... ... ... | Bull | U.K. | F. Vigue, Kimberley (26/7/13). |
| "Haarlem Adam," No. 1383 | " " ... ... ... ... ... ... | " | " | " " |
| "Hyliam Grace II.," No. 8954 | " " ... ... ... ... ... ... | Heifer | " | " " |
| No. 8852 ... ... ... | Lincoln Red Shorthorn Association ... ... ... | Bull | England | Farrar Bros., P.O. Box 305, Johannesburg. |
| No. 8358 ... ... ... | " " Herd-book ... ... ... | " | U.K. | E. M. Grantham, Zululand. |
| No. 8360 ... ... ... | " " " ... ... ... | " | " | " " |
| No. 9115 ... ... ... | " " " ... ... ... | " | " | " " |
| No particulars ... ... | " " " page 19 ... ... | " | " | Hayward, Young & Co. |
| No particulars ... ... | Shorthorn.—Shorthorn Society ... ... ... ... | " | " | W. K. Anderson, Ixopo, Natal. |
| No particulars (6 animals) | " " " ... ... ... ... | Heifers | " | A. G. May, Stagstones, Rosetta, Natal. |
| No particulars (4 animals) | " " " ... ... ... ... | Bulls | " | Agri. Co-operative Union, Maritzburg. |
| No particulars ... ... | " Coates Herd-book, vol. 59 ... ... ... | Bull | " | J. S. Gibson, Mooi River, Natal. |
| No particulars (2 animals) | " " " " 58–59 ... ... | Heifers | " | S. B. Woollatt, Mooi River, Natal. |
| "Napoleon," No. 21647 ... | " Shorthorn Society ... ... ... ... | Bull | Ireland | H. Trollip, River View, Witmos, C.P. (30/7/13). |
| "Ardargie Count," No. 21195 | " " " ... ... ... | " | " | Barry Gradwell, Holmsdale, Bloemfontein (31/7/13). |
| "Ocean Elf 7th," No. 21637 | " Coates Herd-book, vol. 59 ... ... ... | Heifer | " | L. H. Trollip & Son, River View, Witmos, C.P. (31/7/13). |
| "Empress" ... ... ... | " " " vol. 58, page 108 ... | Cow | " | T. A. Sinclair, Fort Beaufort (31/7/13). |
| "Cornflower" ... ... | " " " " 58, " 497 ... | " | " | " " " |
| "Bally Neal Adam," No. 110870 | " " " " 58, " 21 ... | Bull | " | " " " |

| Stud-book No. or Name. | Breed and Stud-book in which Registered. | Sex. | Country of Origin. | Importer's Name and Address. |
|---|---|---|---|---|
| CATTLE (*contd.*): | | | | |
| No particulars (2 animals) | Hereford.—Hereford Herd-book Society, vol. 44 ... | Bulls | U.K. | F. T. Heys, Pretoria. |
| No particulars (3 animals) | South Devon.—South Devon Herd-book Society ... | Cows | " | Harding & Parker, Frankfort, O.F.S. |
| No particulars ... ... | " " " " ... | Heifer | " | " " " |
| No. 4219 ... ... ... | " " " " ... | Bull | " | W. G. Randles, Highlands, Natal (31/7/13). |
| No. 4633 ... ... ... | " " " " ... | " | " | " " " |
| No. 7799 ... ... ... | Devon.—Devon Herd-book, vol. 79 ... ... ... | " | " | A. Webster, Kroomdraai, Transvaal (31/7/13). |
| No. 7608 ... ... ... | " " " " ... ... ... | " | " | " " " |
| No. 24401 ... ... ... | " " " " ... ... ... | Heifer | " | " " " |
| No. 25163 ... ... ... | " " " " ... ... ... | " | " | " " " |
| No. 25165 ... ... ... | " " " " ... ... ... | " | " | " " " |
| No. 25166 ... ... ... | " " " " ... ... ... | " | " | " " " |
| No. 25168 ... ... ... | " " " " ... ... ... | " | " | " " " |
| No. 25170 ... ... ... | " " " " ... ... ... | " | " | " " " |
| No. 25171 ... ... ... | " " " " ... ... ... | " | " | " " " |
| "Willett Buttercup 13th," No. 25686 | " " " ... ... ... ... | " | " | S. B. de la Harpe, Hopewell, Queenstown. |
| "Willett Daffodil 3rd," No. 25687 | " " " ... ... ... ... | " | " | " " " |
| No. 9707 ... ... ... | Ayrshire.—Ayrshire Cattle Herd-book Society... ... | Bull | " | H. Swift Lister, Lidgetton, Natal (31/7/13). |
| No. 35432 ... ... ... | " " " ... ... ... | Heifer | " | " " " |
| No. 35433 ... ... ... | " " " ... ... ... | " | " | " " " |
| No. 35124 ... ... ... | " " " ... ... ... | " | " | " " " |
| SHEEP: | | | | |
| No particulars ... ... | No particulars ... ... ... ... ... ... | Ram | " | F. J. Nel, Spitzkop, Nelsburg, Greytown, Ntl. |
| "Jack Johnson," No. 840... | Rambouillet ... ... ... ... ... ... | " | S. Australia | J. S. Minnaar, Graaff-Reinet, C.P. (30/7/13). |
| "David," No. 470 ... ... | " ... ... ... ... ... ... | " | " | P. A. Luckhoff, " " |
| PIGS: | | | | |
| No particulars ... ... | British Berkshire Society... ... ... ... ... | Sow | England | Dr. C. F. K. Murray, Kenilworth House, Kenilworth (24/6/13). |
| " ... ... | " " ... ... ... ... ... | " | " | " " " |
| " ... ... | " " ... ... ... ... ... | Boar | " | " " " |
| " ... ... | Tamworth.—National Pig Breeders' Association ... | " | U.K. | Hermann Oppenheim, Senekal, O.F.S. |

# Departmental Notices.

## *NOTICE.*

***The usual notice regarding the Organization of the Department of Agriculture is omitted from this issue owing to pressure upon our space.***

### TOBACCO SEED.

The Tobacco and Cotton Division has a quantity of selected and acclimatized tobacco seed of heavy and bright types for distribution during 1913. All applications for seed must be sent to the Chief of the Tobacco and Cotton Division, P.O. Box 516, Pretoria, accompanied by postal orders to cover cost of same.

This seed will be distributed pro ratio at a charge of 1s. per oz.

*Turkish Tobacco Seed:* The following varieties of Turkish seed can be obtained from the Officer in Charge of Turkish Tobacco Experiments, Stellenbosch, Cape Province, at the prices quoted, viz.:—

| | |
|---|---|
| Soulook | 4s. per oz. |
| Malcadje | 4s. „ |
| Baladovari | 4s. „ |
| Dubeck | 5s. „ |

W. H. SCHERFFIUS,
*Chief of Tobacco and Cotton Division.*

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### CLEANING AND GRADING TOBACCO SEED.

The Tobacco and Cotton Division, Union Department of Agriculture, Pretoria, are prepared to clean and grade tobacco seed sent to them by farmers free of charge.

The process separates the light from the heavy seed, and the result is that a much larger percentage of the cleaned seed will germinate.

W. H. SCHERFFIUS,
*Chief of Tobacco and Cotton Division.*

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### COTTON SEED.

Selected seed of several varieties of American Upland Cotton can be obtained from the Tobacco and Cotton Division, Union Department of Agriculture, Pretoria, at a charge of 3d. per lb.

In every case a remittance must accompany the order for seed.

W. H. SCHERFFIUS,
*Chief of Tobacco and Cotton Division.*

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### VETERINARY RESEARCH LABORATORY, ONDERSTEPOORT.

#### ADMISSION OF VISITORS.

It is hereby notified for the information of the public that visitors cannot be admitted to the Veterinary Research Laboratory at Onderstepoort during working hours on weekdays unless a special permit has previously been obtained from the Secretary for Agriculture.

The most convenient time for visitors to be shown over the Laboratory is Sunday afternoon, when an officer will be specially detailed for the purpose and permits will not be required.

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### PIGS FOR SALE.

Large White, Yorkshire, and Berkshire Pigs are for sale from the Tweespruit Stud Farm, P.O. Tweespruit, and Large Blacks and Berkshires from the Roodepoort Stud Farm, P.O. Dewetsdorp. Inquiries should be addressed to the Managers of the farms mentioned.

## GOVERNMENT WINE FARM, GROOT CONSTANTIA.

### VISITORS' DAYS.

It is notified by the Secretary for Agriculture that it has been decided that persons shall be allowed to visit the Government Wine Farm at Groot Constantia between the hours of 9 a.m. and 5 p.m. on Mondays, Tuesdays, and Thursdays.

## EXPERIMENT FARM, CEDARA.

### SITTINGS OF EGGS FOR SALE.

Sittings of eggs from Plymouth Rock, White Wyandotte, White Leghorn (English and American), Buff Orpington, and Indian Game fowls, will be for sale during September and October at 10s. per sitting f.o.r. buyer's nearest railway station (in Natal only). Guaranteed fertile on dispatch, and will be replaced only if returned, carriage paid, in box in which originally dispatched from Cedara. Egg boxes charged 6d. each.

Applications to be made to the Principal, School of Agriculture, Cedara, and remittance should accompany order.

## EXPORT OF CITRUS FRUIT.

It is hereby notified for the information of fruit growers and others concerned in fruit export that the Union-Castle Steamship Co. is agreeable to the acceptance of UNGRADED citrus fruit for conveyance in the cool chamber of its vessels at an extra charge of 10s. per ton.

## CATTLE SHIPMENTS FROM HOLLAND.

In connection with the free freight contract existing between the Union-Castle Company and the Government, it is hereby notified for the information of intending shippers that it is the intention of the Union-Castle Company to dispatch a cattle boat, the "Muansa," from Rotterdam to South Africa on or about the 13th proximo.

As the dispatch of these boats direct from the Continent is contingent upon a sufficient number of cattle being forthcoming to warrant the expenditure, it is hoped that full advantage of this boat will be taken by importers.

## CHANGE OF OFFICES.

As the *Journal* goes to press, the headquarters of the Department of Agriculture have been transferred to the Union Buildings, Pretoria. For the convenience of visitors, in the next issue of the *Journal*, full particulars will be published as to the divisions which have been moved and those which have remained in town.

Farmers requiring permits should note that letters should be addressed to the Senior Veterinary Surgeon, P.O. Box 216, Pretoria; and telegrams to "Veterinus Christy," Pretoria.

## PIGS FOR SALE.

Pedigreed Large Black pigs, farrowed 17th March, 1913, are for sale from the School of Agriculture, Grootfontein, Middelburg, Cape Province.

Inquiries should be addressed to the Principal.

## DEPARTMENT OF AGRICULTURE LIBRARY.

### LIST OF COMPLETE WORKS ACQUIRED DURING JULY, 1913.

Craig, John A.—" Sheep-farming in North America." New York, 1913.

De Seynes, J.—" Recherches pour servir à l'histoire naturelle et de la Flore des Champignons du Congo Français." Paris, 1912. (Deposited with the Plant Pathologist.)

" Recherches pour servir à l'histoire naturelle des Vegetaux infereurs." Three parts. Paris, 1912. (Deposited with Plant Pathologist.)

Kolle, W., and A. von Wassermann.—Handbuch der Pathogenen Mikroorganismen." Band II, 2, and Band V. Jena, 1913. (Deposited with the Director of Veterinary Research.)

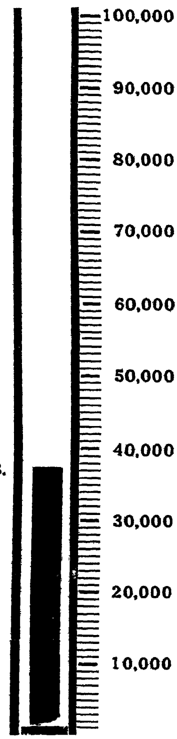
Warren, G. F.—" Farm Management." New York. 1913.

# CIRCULATION GAUGE.

**DO YOU READ THE**
***AGRICULTURAL JOURNAL?***

SEPTEMBER, 1913.

**IF NOT,**
**WHY NOT?**



# NOTICE.

The attention of intending settlers is invited to the provisions of Section 11 of the Land Settlement Act, No. 12 of 1912, which reads as follows:—

1. If any such person as in section 19 is described make written application to the Minister—

(*a*) requesting that certain land specifically mentioned and described by plan or otherwise in the application, be purchased by the Minister for settlement purposes on behalf of the applicant;

(*b*) stating the maximum purchase price of the land;

(*c*) stating that the applicant is willing to contribute forthwith not less than one-fifth of that maximum purchase price,

the Minister may, with the approval of the Governor-General and subject to the provisions of this Act, purchase the said land.

2. Before completing an agreement for the purchase of land under this section, the Minister shall require the applicant to deposit, or lodge satisfactory security for the payment of, the applicant's share of the purchase price and in determining the amount of that share regard shall be had to the actual purchase price, any modification of the terms and conditions of the application and of any special conditions to be included in the lease to be issued to the applicant as hereinafter provided. Any such modifications of the application shall be in writing signed by the applicant.

3. As soon as the purchase is complete and transfer of the land into the name of the Government has been obtained, the land shall be allotted upon lease to the applicant subject to all the provisions of this Act and at a valuation equal to the aggregate amount of the purchase price, cost of transfer, survey fees, and other expenditure of the Minister in connection with the purchase, transfer, and allotment of the land;

Provided that—

(*a*) the right of the lessee to purchase the land as hereinafter provided shall be deemed to have been exercised as from the date of the commencement of the lease;

(*b*) the amount contributed by the applicant towards the purchase price as aforesaid shall be considered as a payment by him on account of purchase price and any such half-yearly instalments of principal and interest payable as are hereinafter provided shall be reduced accordingly.

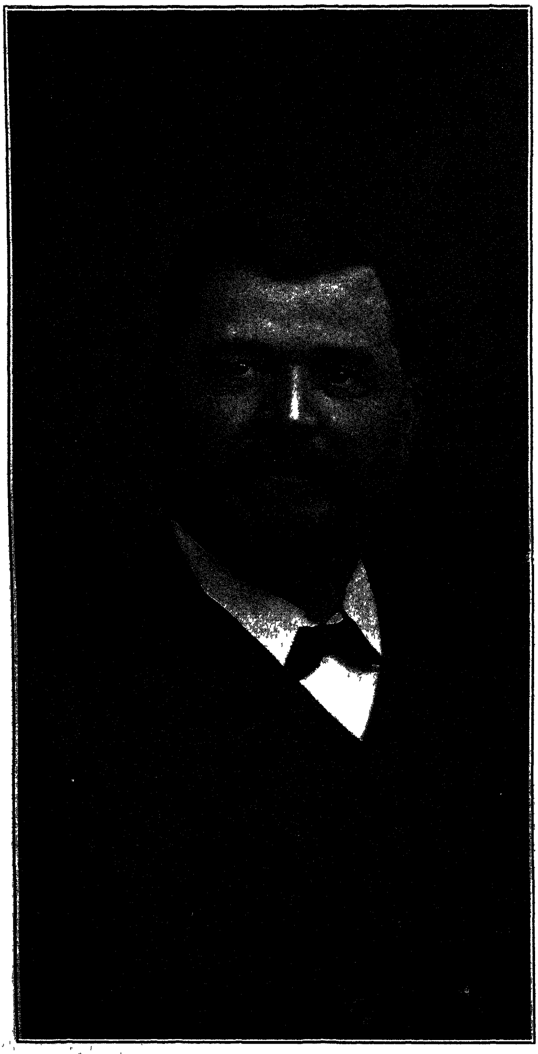
If the holding allotted as in this section provided be forfeited under this Act for any breach of or non-compliance with the provisions thereof or the conditions of the lease, the Minister may in his discretion declare that the whole or any portion of the amount contributed by the applicant towards the purchase price aforesaid be forfeited to the Crown.

Information as to the procedure to be followed in making application under the above-quoted section may be obtained from the Secretary for Lands, Pretoria, from whom also copy of the Land Settlement Act, 1912, may be obtained free.

G. R HUGHES,
*Secretary for Lands.*

DEPARTMENT OF LANDS,
PRETORIA. *2nd June*, 1913.

30-35



THE HON. H. C. VAN HEERDEN,
Minister of Agriculture.

*Plate No. XLVII.*

# The Agricultural Journal

## OF THE UNION OF SOUTH AFRICA.

Vol. VI. OCTOBER, 1913. No. 4.

Issued MONTHLY in English and Dutch by the Department of Agriculture.
Communications to be addressed to the Editor, Department of Agriculture, Box 515, Pretoria. Telegraphic Address: "Bulletin, Pretoria."
*Advertising* inquiries should be addressed to the Metropolitan Advertising Co., Box 962, Capetown.

## Editorial Notes.

These fires are one of the great dangers of California . . . for it is not only the pleasant groves that are destroyed; the climate and the soil are equally at stake, and these fires prevent the rains of the next winter and dry up perennial fountains.—R. L. STEVENSON.

**The New Minister.**

Among the Cabinet changes which General Botha made last month came the decision to grant the Portfolio of Agriculture the full services of a Minister (instead of as hitherto allowing it to form one of a dual holding), and it is accordingly our pleasing duty this month, ere we proceed to the usual discussion of matters of current interest, to offer on behalf of the Department of Agriculture a cordial welcome to the gentleman who has accepted the portfolio to which the Department belongs.

Mr. Hercules Christian van Heerden, who is the member for Cradock, is noted as a progressive and successful farmer. He was born in the early sixties at Tarka, in the Queenstown District, and is a grandson of Commandant Gottlieb Venter, who took a prominent part in most of the early Kaffir wars and was commandant of Tarkastad in the Gaika and Gcaleka rebellion. Mr. Van Heerden matriculated at Victoria College, Stellenbosch, and shortly afterwards decided to make farming his avocation, which calling he has followed with great success. His popularity and good qualities have been such as to secure for him the representation of the Cradock constituency in Parliament for the past twenty years. On the death of the Hon. Thos. Theron, the member for Richmond, Mr. Van Heerden was appointed Chairman of Committees in the old Cape House of Assembly. He also succeeded Mr. Theron in the chairmanship of the Afrikander Bond. Mr. Van Heerden became Chairman of the South African Party at the Congress last year, and it is hardly necessary to add that he is the Chairman of Committees in the present House of Assembly.

**Progress of Lamziekte Investigation.**

In this issue we publish an article by Dr. William Robertson, the Acting Director of Veterinary Research, on lamziekte, which will doubtless be welcomed by those farmers—and they are many—who are very closely interested in the progress of research in connection with this baffling disease. In this article the history and distribution of lamziekte are set forth and the disease itself is described; then follows an account of what is known about it, and such advice is offered as may be given in the light of our present knowledge; and the article concludes with an account of the experiments which are being conducted by the staff of the Veterinary Research Laboratory.

There have been many theories put forward to explain the cause of the disease, but these may be conveniently grouped as follows:— (1) The contagion theory, by which lamziekte is held to be due to some direct special infective agent or micro-organism as is the case with sponsziekte, meltziekte, and lung-sickness; (2) the deficiency theory, by which it is held that the cause is want of some constituent in the food; and (3) the toxic or poison theory, by which it is held that certain poisonous matters elaborated in the feed are taken into the animal's body and develop the symptoms of the disease. The last theory is the one held by Dr. Theiler, and the one that can most easily and most logically be defended. It explains why animals do not develop the disease at once on exposure to lamziekte veld, as the poison may be what is called cumulative—it takes some time to show its effects, just as man or a beast can take small doses of strychnine daily for a considerable time without showing any effect; yet quite suddenly the poison in the system will make itself felt and all the symptoms of strychnine poisoning appear. Again, it is known that exercise and additional food have a beneficial effect on lamziekte. It may be that the increased activity of the body cells set up by the exercise or food causes the constitution to throw off the poison alluded to.

**Difficulties of the Investigation.**

The account of the experimental work which Dr. Robertson gives will be found interesting. A great deal of experimental work has been done, but it has been, and still is, very much hampered by the complete inability so far to produce a case of lamziekte at will—all attempts to convey the disease from a sick to a healthy beast have failed. It will be realized how severely research is handicapped thereby. Remedies have been suggested and preventives introduced, but the investigators will be almost powerless to test their value so long as they are dependent upon natural cases of the disease for material—often, just as they are starting work, the disease disappears from the farm in its usual mysterious manner.

It is interesting to notice that inoculation work is being carried on, for it has been observed that the inoculation of a lamziekte herd with the vaccine of redwater, sponsziekte, or meltziekte seems to arrest the disease. Working with this idea in view, Dr. Robertson is carrying out extensive experiments in the Christiana District, and hopes to have a thousand head inoculated before the lamziekte season commences, when the method will speak for itself. It may be added

that every fluid and tissue in the body of a lamziekte beast has been most carefully examined and inoculated in every case into clean cattle, but so far the results of microscopic examination and inoculation have been negative.

The disease is a most baffling one, and its elucidation will call for all the intellectual resources of not one, but many, trained investigators. Stock owners will therefore note with satisfaction that Dr. Theiler, who has lately returned to South Africa, has brought with him a physiological chemist (Mr. H. H. Green) and an eminent Professor of Pathology (Dr. E. Hedinger), who will assist in the elucidation of this, one of the greatest of our present cattle scourges.

**South African Agricultural Union.**

Owing to the exigencies of monthly publication it was not possible for us to comment upon the South African Agricultural Union Conference which was held in Durban at the end of August, under the chairmanship of the President of the Union, Mr. C. H. Mitchell. The meeting was well attended, and all four Provinces of the Union were represented, as well as Rhodesia and Mozambique. The congress was well up to the standard of its predecessors, as well in regard to the value of the work which it accomplished as in regard to the attendance and to the spirited nature of the discussions; and the formal opening addresses, which have become a feature of these conferences, were as commendable for their breadth and their hopeful outlook upon the future as ever. The opening ceremony was performed by Senator Sir Frederick Moor, who, himself a farmer and a leader of politics in Natal for many years before Union, has been closely identified with agricultural progress—and was, indeed, one of the prime movers in the establishment in 1907 of a regular export trade in South African maize; and the measured utterances of one so intimately familiar with the peculiar conditions of this country were bound to be followed with the close attention and keen interest which were evident among the delegates at this gathering. The President's address, which followed, was equally well received, and the two speeches together formed an interesting review of the present situation of agriculture and of the prospects of the future.

The practice of the South African Agricultural Union of electing a fresh president at each annual session, whatever may be its other advantages, is commendable in this respect, namely, that it provides an ever-changing and ever-fresh outlook upon the economics of the land. Each fresh president brings with him fresh ideas—ideas backed up by many years of hard experience. The delivery of a presidential address—now become a regular institution—enables a survey of farming conditions and rural problems to be made from an ever-new view-point. And the result is that, while the ideas of the units of the Agricultural Union are enlarged, the dull settling down into one rut—into a single outlook—which might conceivably result from the election of a president for a terms of years is avoided.

**The Value of the Union.**

Sitting in the basement-room of the Durban Town Hall, where this year the conference was held, and observing that body of seventy

or eighty representative farmers gathered together from all parts of South Africa, it struck us what an example of organization this South African Agricultural Union constituted. Considering the large area which these men represented the meeting was a small one, but the organization of which their presence in Durban was the outcome is wonderful in its simplicity and its comprehensiveness. We have, first, our district farmers' associations—small bodies, it is true, but through the medium of which any farmer may become represented at the deliberations of the ultimate body, the South African Agricultural Union. Then we have the four Provincial bodies and the Rhodesian Union, constituted of representatives of the district associations; and these larger bodies in turn supply the delegates that go to form the South African Agricultural Union.

The South African Agricultural Union is considerably older than the political union which the Colonies of the Cape of Good Hope, Natal, the Transvaal, and the Orange Free State banded together to form. Its work has been carried on for many years under greater difficulties in the Colonial days than now, because there were then five Administrations to deal with instead of two as at present. And when we contemplate the work which has been accomplished the thought does not seem to be an unreasonable one that the old Inter-Colonial Agricultural Union did no small work in helping to clear away the difficulties and make possible sooner the political union which was bound to come in the course of time. The meeting together each year upon common ground of representative men from all corners of South Africa was bound to act beneficially in helping to clear away such prejudices as might have served as obstacles to political union. But apart altogether from this every one who attends these annual meetings of the Agricultural Union must be impressed by the spirit of good-fellowship, the mutual desire to help each other, and the very evident determination to break down provincialism wherever possible which is ever noticeable; indeed, the introduction of provincial aspects into the debates is coming to be tacitly recognized as "bad form"!

As to the other aspects of these conferences—the relations between the union and the Government—we can only repeat what we have said on former occasions that the Department of Agriculture welcomes suggestions from such conferences, since its desire is to work harmoniously with and wholly for the welfare of the farmers of South Africa. We are all working towards one end, the improvement of farming conditions and practice, and the Department looks to the farmers for co-operation and for advice as to their needs.

**The Farmers' Tour.**

When these lines fall under our readers' eyes the Editor of the *Journal*, Dr. Macdonald, will have returned to South Africa after a six months' absence. He has spent a busy time in England and Scotland, and will doubtless have much interesting information to lay before readers of the *Journal* during the course of the next few months. His home-coming is being awaited with especial interest by many on account of the details of the farmers' tour next year which he will announce at the Dry-Farming Congress early in November. The tour, which Dr. Macdonald has long preached, has become a

practical proposition as the result of the generous invitation of Sir Owen Philipps, the Managing Director of the Union-Castle Steamship Co., Ltd., for fifty South African farmers to visit England as guests of his company. The conditions laid down by the Union-Castle Company have been published broadcast, so that it is unnecessary for us to repeat them here. The only further development of interest, so far as the English tour proper is concerned, is the announcement cabled by Reuter regarding the gracious invitation of His Majesty the King to the delegates to lunch at Windsor Castle and afterwards to inspect the Royal farms.

The tour, however, is not to end with England, for it is proposed to extend it to Holland and possibly to Denmark. A recent Reuter cable states that Mr. W. H. Poultney, the Secretary of the Witwatersrand Agricultural Society has been entrusted with the organization of the extension tour to Holland. The Royal Agricultural Society of Holland, of which the Prince Consort is president, has extended a formal invitation to the whole party to visit Holland as the guests of the society at the termination of the English part of the trip. An itinerary is being prepared and it promises to be on a most generous scale. The well-known shipowners, Messrs. Wm. H. Muller, of Rotterdam, have kindly consented to place their vessels at the disposal of the party for its conveyance from London to Holland and back; and on landing in Rotterdam the delegates will be provided with free passes over the whole of the State railways of Holland.

We have referred above to the Dry-Farming Congress. This year this congress will be held in Johannesburg, commencing on the 5th November, and His Excellency the Governor-General has been pleased to consent to perform the opening ceremony. The preliminaries of the congress are now being arranged, and details will shortly be published.

**Inoculation against Horse-sickness.**

The scale of fees (including insurance premium) at present in force for the inoculation of horses against horse-sickness is as follows: For a horse valued at £10, the fees are £1. 10s.; for a horse valued at £11, the fees are £1. 12s.; and so on up to the maximum for a horse valued at £30, for which the fees are £3. 10s. This scale was based on the assumption that the mortality to be expected during immunization would be 10 per cent., and the difference between 10 per cent. and the actual fee chargeable for a horse represents the approximate cost to the Government of preparing the serum (i.e. 10s. per dose). An additional notice has been gazetted, which reads as follows:—

In order to meet the wishes of those owners who are willing to incur the risk of having their horses or mules inoculated against horse-sickness without insurance, Government Veterinary Surgeons will be prepared also to undertake the immunization of horses and mules against horse-sickness without insurance as soon as possible after publication hereof in the *Union Gazette* in the districts in which they are stationed on payment of a fee of 10s. per animal, provided the owner signs a declaration to the effect that he understands clearly that he forfeits any claim to compensation in the event of any animal dying as a result of the inoculation, and that the Government gives no guarantee regarding the immunity of the animals inoculated.

Any animal intended for inoculation may, at the discretion of the Government Veterinary Surgeon, be tested with mallein before being inoculated against horse-sickness.

It is of interest to note that the method was introduced into the Transvaal in an experimental way in October, 1911, when no owner

was allowed to have more than two horses done. In the following March the issue of material was stopped in order to enable the authorities to compare the results obtained. It was then seen that, out of the 445 horses inoculated during that time, 46 died—or 10.3 per cent.—and this result seemed to justify a continuation of the method during the ensuing season. Arrangements were accordingly made for the preparation of another 500 doses of the material, and the other Provinces of the Union were given an opportunity of taking advantage of the inoculation, but there seemed to be very little demand for it, and as a result only 50 horses were done outside the Transvaal—49 in the Cape and 1 in Natal.

The total number inoculated during 1912-13 was 415, with deaths totalling 65; so that since the inoculation was introduced the figures read:—

| No. Immunized. | No. that Died during Immunization. | Percentage of Deaths. |
|---|---|---|
| 870 | 109 | 12.5 |

It must be understood, however, that among the 109 deaths there were several cases where the actual inoculation could not be held responsible; for instance, biliary fever was the actual cause of death in some cases, whilst other horses were already in the incubation stage of the disease when they were inoculated, although it was not possible to detect these cases at the time. By excluding these animals—numbering in all 12—the actual mortality can be considered as 97 out of 870, or 11.1 per cent.

**Value of Artificial Immunization.**

Apart from the question of mortality during immunization against horse-sickness, there is one other factor of great importance to be considered, and that is the extent of the immunity conferred by the artificial immunization. It must be understood that this artificial immunity cannot be any improvement on the immunity which a horse obtains by "salting" in the usual way; and, bearing this in mind, it must be expected that relapses (or *aanmanings*) will occur in the artificially immunized horses to at least the same extent as they do in the case of naturally salted animals. Many instances have been reported where horses that "salted" two, three, and four years ago died during the 1912-13 season of horse-sickness, although these animals had never been off the farm on which they originally salted. In fact, the Government authorities doubt if there is such a thing as an absolutely salted horse in the Union.

In order to obtain information on this point, the Veterinary Research Laboratory circularized all owners of immunized horses, asking for a return of the deaths amongst those horses. At the same time the owners were asked for an expression of opinion in regard to the severity of the disease during the past ten years. From the replies it appeared that, out of 394 immunized horses that were alive at the commencement of July, 1912, 23 were considered to have died of horse-sickness during the 1912-13 season. In six of these cases the owners' diagnosis was verified by the injection of blood taken from the dead animals. These samples of blood were forwarded to the Veterinary Research Laboratory, and when injected into susceptible horses the disease was produced.

The general opinion of the Transvaal farmers seemed to be equally divided as to whether 1906-7 or 1912-13 was the worse season for horse-sickness; but, taking into consideration the views expressed by the veterinary staff, it would appear that, although 1912-13 was a very bad year, it was not quite so severe as 1906-7. In any case, however, all are agreed that the past season was an unusually severe one; and the survival of 371 horses out of 394 can be taken as a further proof of the efficacy of the inoculation. It means, in other words, that, out of every 100 horses inoculated, about 89 will survive immunization; and of these 89, 6 can be expected to die of relapses, leaving a survival of 83 out of every 100.

It must be understood, however, that the Veterinary Research Laboratory still consider the inoculation system to be in an experimental stage, and they cannot yet meet the wholesale demands for the serum. Owners wishing to have their horses inoculated are therefore asked to register an application with the Government Veterinary Surgeon of their district. As far as possible all such applications will be dealt with in order of priority.

**Inoculation of Mules.**

Whilst we are on the subject of inoculation against horse-sickness, it may be of interest to mention that the scale of fees now in force as regards mules is as follows:—For a mule valued at £5, the fee charged is 10s.; for a mule valued at £10, the fee is 15s.; and so on up to the maximum for a mule valued at £30, for which the fee charged is £1. 15s.

The immunization of mules is now in its eighth year, the method having first been introduced in 1905. During the past season 1522 mules were inoculated, with a mortality of 42, or 2.8 per cent. The total number inoculated at the present time amounts to over 22,000, with an average mortality of about 5 per cent.

**Efficacy of Blue-tongue Vaccine.**

In a previous issue we referred to the fact that complaints have been made—principally in Natal—against the blue-tongue vaccine issued during the past season. As the material was prepared in exactly the same way and by the same assistants as in the previous two years, the Veterinary Research Laboratory have been investigating these reports and have circularized all farmers who were supplied with the material. It appears from the replies which have been received by the Acting Director of Veterinary Research that, although opinions differ largely in many respects, there is a widespread belief that the material was "weaker" than that supplied in previous seasons, some farmers saying that the vaccine did not produce the disease in the vaccinated sheep and that accordingly no protection was given against a natural attack in the blue-tongue season. This opinion is not, however, borne out by the actual figures to hand, which show that, out of 185,378 sheep inoculated, 647 contracted the disease from the inoculation and died, and 4416 died—presumably from blue-tongue—after the effects of the vaccination had ceased. The mere fact of 647 sheep contracting the disease from the vaccination shows that the

material did contain the organism of blue-tongue and was therefore capable of producing the disease; and if the immunity conferred by the injection failed to protect the sheep against the natural attack, then it shows that the disease was unusually virulent this season, and this point is agreed on by practically all the farmers consulted.

One other point of interest which may be referred to here is the liability of sheep that "salted" in a natural way dying later from relapses. These relapses may be due to either or both of two causes, viz.: (*a*) A variation in the "strain" of the disease, or (*b*) a larger quantity of virus.

The question of a different "strain" has its analogy in horse-sickness, where it is well known that horses "salted" for one district do not always resist the infection existing in another district, and, as we mention elsewhere, some horses even die of horse-sickness on the same farm on which they originally "salted." With regard to the question of a larger quantity of virus, it has been proved that vaccinated sheep are liable to a breakdown in immunity when injected later with a dose of virus larger than that with which they were originally injected. If this can happen in the case of a vaccinated animal it is quite evident that, on a heavily infected farm, salted sheep might die from breakdowns in immunity, due to repeated injections by the carrier of the virus of blue-tongue. In this latter case, of course, it simply means that the carrier of the virus (by repeated injections of the quantity with which the animal originally became salted) acts in a similar way to the case in which the immunity given by vaccination is broken by the one larger injection of virus given through the medium of a syringe.

**Some Practical Cases.**

The following extracts from some of the replies received by the Veterinary Research Laboratory give additional proof that the vaccine cannot be considered "weak" and that the season must be regarded as a severe one. From the Utrecht Division (Natal) comes the report:—

Sheep in good condition; all did well, but any sheep not well or in poor condition are risky.

This farmer inoculated 1200 sheep, of which seven died as a result of the injection from blue-tongue, and five died later as a result of breakdowns in immunity.

A Vryheid (Natal) farmer writes:—

My vaccinated sheep grazed on unhealthy veld (low veld) during the blue-tongue season, and I did not lose one from blue-tongue. My neighbour lost 60 to 70 sheep (uninoculated) which were grazing on high veld, and so I have come to the conclusion that the blue-tongue vaccine must be exceptionally good.

The writer of these words had inoculated 1150 sheep without loss, either during or after inoculation; and he further remarked that the disease was very severe on the unvaccinated sheep.

In a Creighton (Natal) case no deaths followed the vaccination of 350 sheep, and the owner remarks:—

The vaccinated sheep got very sick about ten days after, and I thought a lot of them would die, but they recovered, and but for a few of them losing their wool they got all right again and fattened very quickly.

In the Richmond District, in Natal, a farmer who lost sixteen sheep from breakdown in immunity out of a batch of 1448 vaccinated, says:—

I think ½ c.c. just as efficient as 1 c.c, and that the immunity is just as hard to "break down."

In one case (in the Ladysmith District, Natal) where 1140 sheep and lambs were vaccinated with a loss of three from breakdowns, the farmer says:—

Judging by losses sustained by my neighbours, the past season was a very severe one for blue-tongue. Prior to the introduction of blue-tongue vaccine it was impossible to keep merino sheep on this farm during the summer owing to heavy mortality from blue-tongue. The flock were all more or less affected six to ten days after inoculation, and I consider the inoculation has been most successful in my case.

In the Vryburg District one farmer who inoculated 2800 sheep, of which three died of relapses (none having died during the inoculation), says it was an exceptionally bad blue-tongue season, and adds:—

I consider the vaccine the best preventive one can ever use. The above figures prove it.

Another farmer in the same district only inoculated with half doses and as a result had considerable losses.

Another report (also from the Vryburg District) reads:—

Two hundred and thirty-two inoculated, of which only one died several weeks after inoculation. Some neighbours who did not inoculate lost about 180 head. All my sheep reacted after inoculation, but soon recovered their condition.

In the Barberton District, in a case where 120 sheep were inoculated at a time when the disease had already broken out in the flock, and 30 died, the owner states:—

Deaths ceased within 18 days after inoculation. This year the immunity conferred in 1911-12 broke down in the severe season of 1912-13.

**Other Blue-tongue Matters.**

Among other matters brought to the notice of the Veterinary Research Laboratory in connection with the inoculation against blue-tongue, it may be of interest to mention that three cases have been reported where the owners state that, after the effects of the vaccination were quite over, the mortality amongst the vaccinated sheep, due to the breakdowns in immunity, was much heavier than the mortality from the same cause in non-vaccinated sheep. Dr. Robertson observes that there is only one explanation of this, and that is that the so-called "breakdowns" were not due to blue-tongue, but that some other disease was responsible. The injection of the vaccine cannot increase the susceptibility of the animal to the disease, not even if the material had "no more effect than water"—as one farmer put it!

A case is mentioned where the vaccine was supposed to be so thick that it had to be strained before it could be used, the farmer saying that otherwise the syringe and the needle became clogged. Another case had been reported earlier in the season, and the owner was then asked immediately to return the vaccine for testing purposes at the Laboratory. When it arrived it was found that on shaking the bottle the material quickly returned to its normal condition, and on injection into susceptible sheep the disease was promptly produced. The probable explanation of this, Dr. Robertson says, is that the vaccine

had been subjected to undue heat at some time during its transit from Pretoria to the farmer. The Veterinary Research Laboratory, however, wish to make it known that if farmers will immediately return any bottles in which the vaccine appears to be thick or clotted, a fresh supply will be sent off free of charge.

It may be as well to mention, also, that two instances have been reported where farmers complain that the vaccine is not of the same colour as that supplied in former years. This point is not of much importance, and the two cases may be considered as coincidences. The difference in colour may possibly be due to a slight variation in the colour of the preservative which is added to the blood.

**Mr. Mallinson and Mr. Challis.**

Mr. C. Mallinson, Principal Flockmaster, has returned to South Africa after a three months' visit to England. A considerable portion of his time was occupied in the investigation of the question of the advisability of using lime and sulphur and caustic soda and sulphur dips for scab, in view of the strong opposition to these which has been raised by certain wool-buyers in Bradford. Mr. Mallinson went very carefully into this subject, and has submitted a report on the matter to the Secretary for Agriculture, which report is published in this issue of the *Journal*. In Mr. Mallinson's opinion, provided the dip is used exactly as prescribed in the Government formula, it is one of the very best there is on the market to-day. It must, however, be borne in mind that there is a great deal of rock sulphur which is sold and used as flowers of sulphur: that is where the mistakes and failures have been in the past. Flowers of sulphur has a neutralizing effect upon caustic soda, which, if used alone, is exceedingly strong and harmful. Rock sulphur does not possess that neutralizing effect, so that it is of the utmost importance to see that genuine flowers of sulphur is always used.

Almost synchronizing with Mr. Mallinson's return comes the departure of Mr. E. O. Challis, the Superintendent of Dairying, for Australia and New Zealand on official business. The objects of Mr. Challis' visit are to study the export conditions and regulations in regard to dairy produce, both in Australia and New Zealand; to study in detail dairy legislation as existing and applied throughout those countries; to visit the leading butter and cheese factories in both countries; and generally to acquire such information as may be of value in the development of the creamery industry of South Africa. Mr. Challis expects to be back in South Africa in February, and his place will be taken during his absence by his first assistant, Mr. Hardy.

**Field Trials of Farm Implements.**

We have from time to time drawn attention to and commented upon some of the useful work that agricultural societies and similar institutions are accomplishing and may in the future accomplish, and this month we wish to note another line of activity further practical attention to which on the part of the executives of the larger societies would serve a very useful purpose. We refer to field trials of agricultural implements and machinery, which have constituted such an

important part of the work of associations like those of Cradock and Middelburg (Cape). The idea, of course, of the field trial system is to encourage sellers of agricultural machines and implements to effect improvements in their goods along lines which practical experience has shown to be sound; whilst direct encouragement is also offered to farmers of a mechanical turn of mind to introduce improvements in the machinery they use. Trials are held each year in conjunction with the agricultural show, when farmers may study for themselves the competing implements in operation, and prizes are awarded to the exhibitors whose implements approximate most nearly to the requirements laid down by the field trials committee.

The few societies that are conducting these annual trials are doing most useful work—work that, if sufficiently well and sufficiently extensively carried on, should have a lasting and beneficial effect in raising the standard of effectiveness of farm machinery, according to the requirements of this country. The greater the effectiveness of a machine, the higher its value; and, in the case of farm work, implements must conform to the requirements of the country. Very little agricultural machinery is manufactured in South Africa, and we are consequently dependent upon oversea manufacturers to fulfil our requirements. Those manufacturers are becoming more and more alive to the peculiar needs of this country, and any practical suggestions which can be offered by the users of farm implements will not only be welcomed by the manufacturers, but will also be of material benefit to the farming community of this country as a whole. And one important manner in which such suggestions can be offered is through the agency of the field trials system.

**How the System is Worked.**

As a practical example of how these field trials are arranged, and as indicating their practical value, we may take the trials which have been arranged by the Cradock Agricultural Society to be held in conjunction with their next annual show, particulars of which are before us. The society is offering the sum of £25, in two prizes of £12. 10s. each, for two different implements. One of these implements that is required is a light plough, suitable for making furrows in wheat lands which have already been ploughed to a depth of 8 inches. This implement must have double mouldboards, reaching down to the level of the underside of the soleplate, and capable of cleaning out all the loosened ground to the full depth of the same, so as to form a furrow about 6 inches broad at the bottom, with sides sloping at angles of 45 degrees. The mouldboards, at the beam and along their full length, must be hanging over very much forward so as to prevent ground from passing over them and to make it roll forward, as it were, as it slips back along them. They must be somewhat longer than is necessary to form a furrow of the above shape, so that they will also compress the sides, and thus make them better able to resist the tendency of the water to burst through them. Very thin steel can be used for them, Should the spread of the mouldboards be variable so as to make a little larger furrow if desired, it will be considered an advantage provided that they still clean down to the same depth. The method of expanding and contracting the spread of the mouldboards must be simple and quick.

The other prize of £12. 10s. is offered for a heavier and stronger plough than the above, such as is in general use in South Africa for ploughing heavy soils for the first time. It must be suitable in every way for this purpose, and so arranged that it can easily and quickly be altered to throw out ground which has been already ploughed to a depth of 8 inches, so as to form a furrow about 18 inches broad at the bottom, with sides sloping at angles of 45 degrees. It is suggested that the double mouldboards, which it is presumed will be used for the purpose, should be bolted to a shin piece, and the last named, if strongly made, can be amply secured to the beam by two bolts, so that very little time will be taken up in disconnecting the single right-hand mouldboard, etc., and in connecting the double mouldboard. These can be of thin steel, and the same remarks apply to them as to the lighter plough above in regard to their shape.

Such are the requirements in connection with next year's competitions at Cradock. For the benefit of intending competitors, we give elsewhere the conditions of entry which have been laid down by the committee.

**The Rise of Farm Mechanics.**

Whilst we are on the subject of farm machinery, it is interesting to observe that the ever-increasing use of machinery and the employment of engineering skill in connection with farming operations are evidence of progress in modern methods in agriculture. The high cost of production has been due in the past to the employment of hand labour, which must needs be expensive. With the advent, however, of machinery on the farm, hand labour has been supplanted and the cost of production of farm crops brought to a lower level. Such, at least, has been the experience in the United States.

Also, with the advent of machinery, nearly all operations on the farm have been more or less revolutionized and to such an extent that in these days a successful farmer must have at least some engineering skill—enough to be able to produce crops more economically than heretofore.

It is for this reason that in the United States a new branch of trade in connection with agriculture has been developed—a trade which observes the needs, in a mechanical way, of modern farm operations, and endeavours to satisfy these demands. The American agricultural colleges have realized these demands and have added to their departments a department of agricultural engineering. Cornell University, Michigan Agricultural College, the Universities of Wisconsin and of Nebraska, and the Iowa State College of Agriculture and Mechanic Arts were among the pioneers in the new movement, and maintained each a department of farm mechanics. Of these colleges, however, Iowa State College was the first to institute a regular course in agricultural engineering. The scope of this branch of agriculture is very extensive, and as taught at the last-named college includes briefly the following subjects:—

First, the study of agricultural machinery and implements which are necessary for the production of agricultural products, from the preparation of the soil to the harvesting of the crop. In connection with this comes the study of farm motors, the study of animals as

motors, and the study and operation of benzine and steam motors. Included also is the study of windmills, pumps, etc.

Second, the study and practice of drainage and irrigation methods. In connection with this the agricultural engineer is trained in farm mensuration and contour levelling, which will enable him to lay out drainage and irrigation systems intelligently.

Third, the study of roads and pavements, suitable for country traffic. This study includes the location and building of country roads, with special emphasis on the problem of facilitating traffic on these roads.

Fourth, the study of the economic location and construction of farm buildings, including farmhouse, cattle and horse barns, hog barns, and all other necessary buildings. The extensive use of reinforced concrete in farm structures has introduced the study of this material for building purposes on the farm. The construction of dams and reservoirs is evidently connected with this study and use of concrete.

The foregoing are the main divisions of the agricultural engineer's trade. They are all closely connected, and all are necessary. Minor details would show that the agricultural engineer must study soils as to fertility, have a knowledge of crops, and have, in short, a general agricultural education, specializing in the four divisions mentioned.

The field open to the efforts of the agricultural engineers is very vast in the United States, and of a necessity must be anywhere, including South Africa, where modern methods of agriculture must be applied, and are now being supplied to a greater extent than in the days gone by. This is realized by the Department of Agriculture, and lectureships in agricultural engineering have been instituted at the Schools of Agriculture, where all the various branches of the subject are taught according to the requirements of South African conditions. Farmers seeking advice can obtain same on application to the nearest School of Agriculture (a list of which institutions is generally to be found at the end of the *Journal*).

**Osiers and Canes.**

To any one who has had the opportunity of studying more or less closely the rural economics of South Africa—or indeed of any single State of the sub-continent—during the last twenty years, one very interesting change must be apparent, a change that is becoming still more manifest as the years go by. We refer to the increasing availability of markets. There was a time when, though certain useful crops could be grown, they could not be marketed, at least in quantities sufficient to make their extended cultivation a success. There were crops that could not very well be exported, partly because of the lack of the necessary facilities, and partly because their export could hardly be expected to pay, whilst the local market was unable to provide an outlet. Now, however, the conditions of this country have changed to such an extent that the local establishment of a number of manufacturing industries which look to the farmer for their raw materials has become possible, and the result, combined with better facilities for the export of other crops, is a slowly but steadily increasing range of farm products. Such improved conditions make for greater stability in farming, besides extending the wealth-producing capacity of the land.

We are naturally led to these reflections by a communication which has been received from the Director of the South African Wicker Company, of Durban, in which reference is made to the growing of osiers, canes, and other raw materials of the wicker work industry. For several years past osiers have been fairly successfully grown on a considerable scale on one or two farms in Natal, and these are being used with good results by the South African Wicker Work Company for the manufacture of chairs and baskets. Evidently the market for osiers, etc., is extending, for the company asks us to make it known that it is willing to place its experience in the growth of these products at the disposal of farmers, and at all times to give advice in regard to cultivation, etc. We are also desired to suggest to farmers that they send the company samples of any cane they may have grown on their farms, at the same time supplying full particulars regarding climate, soil, and irrigation. Upon receipt of such samples the company will be pleased to give its opinion.

Here is a case illustrating what we said above in regard to the change that has come over the economic conditions of this country. A market is provided for a certain product, and farmers are invited to produce that crop. Certainly it is not an ordinary farm product, but there seems no reason why farmers in suitable localities should not turn their attention to the culture of osiers as well as canes, even if only as a side line. What in our mind renders the proposition the more attractive is this, that by increasing the variety of crops grown the stability of the farm is enhanced, on the principle that one's eggs are not placed all in one basket.

There are various, at present little known, crops that will eventually become valuable in this way, and that the changing conditions of the country will in due course bring to light. Experience in South Africa has sufficiently demonstrated the folly of taking up new crops without careful forethought, not only as to climatic and soil conditions, but also as regards the extent and value of the market or the value of the crop as stock feed; but, at the same time, when attention is drawn to a possible new crop and a market seems assured, the wise farmer will not lose time in investigating the possibilities of the new venture. This we suggest that readers should do in the present case of osier and cane growing.

**Johannesburg Live Stock Market.**

It is probably only those who are actually engaged in the live stock trade who have anything approaching a just conception of the importance of the Johannesburg market. Some months ago we commented upon the subject, and we have now received statistics published by the Municipal Council of Johannesburg which furnish instructive reading. This statement refers to the live stock trade for the year ended 30th June last, and from it we learn that, during the year, over a million animals (1,051,831, to be exact) passed through the live stock market, not to mention 3417 vehicles, and that the amount realized was approximately £3,660,048. These are the gross figures; an analysis will prove interesting. The bullocks dealt with numbered 93,762. Cows numbered 22,633; and heifers 118 over two years of age and 3381 under two years. Of steers there were 20 over two years

and 5095 under that age. Calves numbered 3854. In addition, 4803 bulls were put through. The range of prices was as follows: Bulls, from £3. 15s. to £32. 10s.; bullocks, from £2. 15s. to £28. 12s. 6d.; cows, from £1. 5s. to £45; heifers, over two years from £4. 10s. to £18, under two years from £2. 10s. to £11; steers, over two years from £3 to £6. 17s. 6d., under two years from £2. 4s. to £19.; calves from 15s. to £6. 10s. The total amount realized for cattle was £2,189,908, or over 60 per cent. of the gross total for live stock. Of horses, 15,843 passed through the market and realized £396,075. There were 2296 mules put through, totalling £59,900; and also 2608 asses, realizing £22,233. Pigs, 44,806 in number, made £112,015; the price per lb. ranging from 1⅛d. to 5½d. Of sheep, there were 792,026, ranging from 3s. to £2 a head, and totalling £732,624; whilst 27,464 lambs were also sold and made £16,478. Goats numbered 33,012, realizing £26,410.

These figures will give some idea of the dimensions of the Johannesburg live stock trade. By far the most important section is cattle, and sheep, as might be expected, come next, though very far behind. The figures are of value as giving some notion of the value of the mining industry, indirectly to the country as a whole, and directly to the farming community.

# Progress in Agriculture since Union.

By P. J DU TOIT, Under-Secretary for Agriculture.

THE object of this article is to endeavour to interpret the statistics available in regard to our agricultural industries in order to arrive at an idea as to the progress which has been made in these branches since the inauguration of Union. In doing so, I have space to deal only with the external, visible signs and not with the means employed to bring about that progress.

## PASTORAL INDUSTRIES.

*Wool.*—Our chief pastoral product, wool, which claims precedence of place, shows a promising improvement. An increase in export from 121,668,034 lb. in 1910 to 161,974,684 lb. in 1912, or 33 per cent. in two years, is gratifying. And it should be noted that this is due not only to the increase in the number of woolled sheep, but also to the larger quantity of wool produced per sheep. In 1907 this quantity was about 5 lb. per woolled sheep; between that year and 1912 nearly another pound (.92) of wool per sheep had been added by improvement of the flocks. Added to this is the fact that, as would be expected from the marked, intelligent attention which is

being bestowed upon this industry, there is an increase in the number of woolled sheep of 25 per cent. in eighteen months (from 21,842,215 since the last census-taking to 27,331,167 at the end of 1912), while the number of non-woolled sheep decreased from 8,814,444 to 8,557,754.

*Mohair.*—This on the whole also shows an advance, though the increase in goats is only from 4,275,335 at the last census-taking to 4,395,101 at the end of 1912. While Angora goats have increased in number, the common goat, notwithstanding that it is more prolific, shows a decline from 7,487,644 to 7,296,061, and, further, it has to be borne in mind that mohair, unlike wool, has a somewhat fickle market, besides being subject to restricted competition. It is an interesting fact, too, that South Africa, while up to 1886 a smaller producer of mohair than Turkey, and for twelve years thereafter sharing the market more or less equally with that country, has since 1899 so increased its output that it now exports annually about two and a half times the quantity which Turkey does, though in the matter of quality the latter still has the lead.

*Hides and Skins.*—Local manufactures from our pastoral products being almost negligible compared to the quantities of such products available, our exports of these can be taken, for our purpose, as a true index of the condition of our pastoral industries. Our exports of hides and skins indicate more or less the number of cattle and sheep consumed, as well as the extent to which disease and drought are more prevalent in one year than another. Thus the export of hides, namely,

| 1910. | | 1911. | | 1912. | |
|---|---|---|---|---|---|
| 13,255,332 lb. | £404,073 | 13,211,734 lb. | £370,548 | 20,428,461 lb. | £670,887 |

shows that the quantity sent oversea in 1912 was too great to be due to increased prosperity alone. Drought and disease accounted for a good deal of the exportation of that year, as is evidenced by the fact that the hides exported rose in two years by as much as 62 per cent. At the same time a portion of the export of 1912 could probably be attributed to the rise in values in that year over 1911.

Drought and a rise in value of skins indicate that the advance also in the export of this article was abnormal in 1912. The figures are:—

| 1910. | | 1911. | | 1912. | |
|---|---|---|---|---|---|
| 31,954,858 lb. | £882,251 | 31,536,597 lb. | £840,979 | 37,241,136 lb. | £1,020,127 |

*Butter and Cheese.*—The effect of drought also appears in regard to dairying. In the last two seasons the milk production was seriously diminished by the almost total absence of rain in the pastoral districts during the first three months of each summer. Consequently the imports of butter rose from 3,606,153 lb. in 1910 to 4,121,216 lb. in 1911 and 4,925,188 lb. in 1912, and of cheese from 4,650,984 lb. to 4,949,356 lb. to 5,165,715 lb. in the same years.

In an article in the *Cape Agricultural Journal* by the present writer at Union the view was expressed that upon this industry chiefly the future agricultural prosperity of this country would depend. The dipping of cattle and consequently the increase in the number of cattle reared and their better condition for slaughter and for milk production; the growing of more foodstuffs; the planting of better pasture grasses; the greater care and better housing of cattle; improved cultivation; attention to pig raising—all these are stimulated by the ready cash which the butter factories give. The value of this industry could not fail to be immediately appreciated, and the response was by means of a rapid organization of co-operative and private dairies. As was inevitable, however, creameries were started sometimes in places where success was impossible and sometimes on lines which courted failure. But, as all experience has to be bought, and at times dearly, so the failures that have occurred, though expensive to those immediately affected, are an asset to the country at large, we need not regard them with concern, for after all they assist the building up of an important and valuable industry on a firmer foundation. In the writer's official experience several failures —five can be recalled at once—have resulted only in temporary setbacks and not in discouraging the industry.

While, however, drought and disease have affected the forward movement in the cattle industry, the latter cause has been the best teacher this country has ever had in regard to stock farming. It would probably not be gainsaid that we are easy-going as a community, but ticks have induced research, spread knowledge, and necessitated care and thoroughness as no other enemy to stock has. Even had we only learned the value of dipping—had not learned to inoculate cattle against redwater, gall-sickness, and other more virulent diseases—our progress might be regarded with satisfaction. We have accumulated knowledge which, if availed of, encourages belief in a successful future.

*Ostrich Feathers.*—Ostrich feathers, which rank next in importance, economically, after wool and mealies, have had exceptional attention from various sections of the public—from producers, consumers, politicians, merchants, and taxpayers in general. Ostrich breeders have a right royal time like the birds themselves, and, like prosperous men in other callings, they are sensitive about their material welfare. Ostrich farmers watch their industry like we do a barometer, and receive a shiver when there is an anti-plumage breeze. But no one will find fault with them. It is well known how much of its agricultural development this country owes to the ostrich and the intelligent management of this king of birds—too well known to require repetition—and an industry that has enriched our pastures, given us splendid irrigation works, hurried on fencing, and in many smaller ways contributed to our agricultural welfare deserves all the coddling that it receives. At the same time I believe that we can do without some of the nervousness that is occasionally apparent. In 1909 we heard of over-production; in 1912 we produced about 50 per cent. more feathers and received a higher price than in 1909. There is no sign of over-production; there is sure indication of expanding markets. There is no competitor in either quantity or quality, and though competition in the former is not improbable, rivalry as regards quality is too remote for present apprehension. Further, the anti-plumage movement in the United Kingdom, as it

does not affect ostrich feathers, will give an impetus to ostrich breeding. The increase in the quantity of feathers exported in 1911, as compared with 1910, was 11½ per cent. (from 741,078 lb. to 826,992 lb.), and in 1912, as compared with 1911, nearly 21 per cent. (from 826 992 lb. to 999,704 lb.). The value of the feathers exported in 1912 was £2,609,638. It should soon reach £3,000,000 in twelve months.

*Horses and Mules.*—We have no means of ascertaining from the point of view of numbers the advance made in horse breeding since Union. The increase between the census years 1904 and 1911, however, has been 60 per cent. (from 449,539 to 719,414). We have a long way to go by way of improving the quality, though the steady effort in this direction made—in those parts of the Union most denuded of horses during the war—by importations of blood stock by Governments and by private individuals, and the continuous importations by established breeders in the older parts of the Union, have made a perceptible difference, and the keener rivalry at our principal agricultural shows is proof of this. On the other hand it seems difficult to find a reason for such marked retrogression as there has been in mule breeding. In every Province except Natal the number has decreased, and in that Province the increase is due solely to heavy importations necessitated by the stoppage of ox traffic on account of, and the devastation of herds by, East Coast fever. For some years there has been a heavy demand for mules throughout South Africa, yet, instead of that demand being met from within, we have resorted to importation, principally from the Argentine, at high prices, and we introduced not only mules, but also disease. Yet a special effort seems to have been made to breed asses. Our mules decreased between the last two census years by 30 per cent.; we bred asses to the extent of 137 per cent. increase. And we had no lack of advice as to the need for mules. Horse-sickness was not the cause of the lethargy; drought was not the cause; the price was the highest ever known; the Union was ransacked for supplies; yet there was no response.

*Pigs.*—These, as well as poultry, we have not yet learned the value of. In 1904 we had 679,084 pigs; in 1911, 1,081,600—59 per cent. more. But hardly any are fit for bacon curing. Few understand the care of them, and only lately an effort has been made by some enterprising parties engaged in dairying to quicken interest in pig breeding among their suppliers of cream. Government institutions have done something to improve the breeds and spread knowledge, but that something has been a drop in the bucket. However, there is some improvement, and the proprietors of dairies, we may expect, will increasingly aid and encourage this profitable line in farming.

*Poultry.*—Some countries have made a great industry of poultry rearing and the sale of eggs. Denmark, Russia, Roumania, Italy, and other countries export eggs by the million—some of these by the hundred million—per annum, principally to Great Britain. We increased our poultry from 6,312,446 in 1904 to 10,533,909 in 1911, and import more eggs than we have ever done before. Between 1910 and 1912 we increased our imports from 14,788,406 (value £49,930) to 18,355,299 (value £69,753), or 25 per cent. There was a time not long ago when those to whom we look for a lead in poultry breeding gave more attention and valuable time to the shape of a bird and the colour of its feathers and legs, to its lobes and comb, than to the eggs it produced. We have become a little saner, but the light is dawning

on us slowly—we still hear that A is a "fancy" breeder and B a "utility" breeder. "Fancy" breeders become so absorbed over the points of a particular breed that they would talk about them till the small hours of the morning to a yawning visitor—like a dog or cat fancier would about his pet breeds—and meanwhile we import 15,000,000 eggs and 240,000 trussed fowls per annum. However, the Western Province Agricultural Society has set the splendid example of holding egg-laying competitions with profit to the competitors and the country at large, and if dairy managers will lend their aid to the collection of eggs, which they can easily do in conjunction with the delivery of cream, they will furnish an outlet for many millions of eggs that now go stale on the farms and encourage the farmer's wife to look to the rather despised fowl to add to her ready cash.

## CEREALS.

*Mealies.*—When we come to cereals we have to give pride of place to mealies. It should be our chief argricultural product, as it is in the United States of America. There are no statistics giving a comparison of production during the past three years, but between 1908 and 1911 the quantity produced increased from 4,077,428 muids to 8,632,516. This indicates that exportation, which now regulates the price in normal seasons, has had an enormous influence on the cultivation of mealies, while at the same time a considerable impetus to mealie growing was given by the co-operative movement in the Transvaal and by railway consrtuction. It is true that the quantity exported fell from 1,760,208 muids in 1910 to 832,742 muids in 1912, but this is the result of a temporary set-back due to drought. A larger area is yearly being brought under cultivation, and, given favourable seasons, there can be no doubt that the production of this cereal will advance with great strides.

*Wheat.*—Between 1908 and 1911 the wheat produced increased from 1,150,000 muids to 1,810,315 muids, an increase of nearly 60 per cent., and naturally the wheat imported (including its equivalent in flour imported) dropped from 2,110,869 muids in 1909 to 1,271,367 muids in 1912, a decrease of nearly 40 per cent., the difference between the two percentages being presumably due to greater local consumption. In the Cape Province alone the increase nearly doubled in two years. At the present rate of increase in the internal supply of wheat South Africa should produce enough for its own consumption in six years.

*Oats and Barley.*—Nor was the increased production of wheat at the expense of any other cereal. In 1908 the quantity of oats raised was about 1,750,000 muids, as well as about 420,000,000 lb. of oat-hay, and in 1911 the corresponding crops were 2,060,922 muids and 506,202,649 lb. respectively, the increases (17 and 25 per cent.) being accounted for principally by the northern Provinces. In addition to oats, 407,636 muids of barley were produced in 1911, as against 305,000 muids in 1908. Greater attention is also being given to the growing of brewing barley, some of which is as good as any produced elsewhere.

## TOBACCO.

As regards this commodity, the only figures available for comparison in respect of the Union are those for the census years of 1904 and 1911, when the production was 12,112,565 lb. and

14,961,199 lb. respectively. The progress, as a whole, has been substantial; but whereas the Cape was by far the largest producer of the four Colonies in 1904, its production in 1911 was less than half that of the Transvaal for the same year. The latter Province, moreover, has much improved the quality of its product. In the intervening years other products have found greater favour in the Cape, if one excepts Turkish tobacco, in connection with which a new and lucrative industry has been created within recent years in the south-western districts. Yet, strange to say, there has been an increase since Union in the imports of both unmanufactured and manufactured tobacco, though in 1912 there was a slight decrease as compared with 1911. On the whole, tobacco has never commanded such high prices as at present, especially in the Transvaal, where grading under technical supervision and co-operation have had a most successful and stimulating effect. With a Customs duty of 3s. per lb. on unmanufactured tobacco, growers have a protection such as hardly any other industry enjoys in comparison with the value of the product concerned. In a very few years the local supply will exceed the demand, and an outlet will have to be looked for oversea. It will be well to consider in the meanwhile what will happen then. Will local prices fall to oversea values (which in respect of most qualities will be less than half the present prices), even if the qualities were raised to the standards of foreign-grown tobacco? If so, will production increase notwithstanding? Or will the high protective tariff keep up the prices for locally consumed tobacco, while the surplus will be exported for what it can command? We have the same problem with regard to another luxury, wine; but there is this difference, that, on the small scale on which individual South African farmers produce wine, they cannot produce at so low a cost and sell at so small a margin of profit as viticulturists in Europe and Algiers can, and consequently, quality for quality, cannot compete with them in other markets, whereas tobacco is one of the most payable crops even at export prices.

## VITICULTURE.

While to discuss the future of this industry is rather outside the purpose of this article, it is not out of place to consider briefly some features which the statistics available present. There are many factors, but principally methods of manufacture and marketing and laws relating to quality and disposal which will affect the future of the viticultural industry, which, as all know, is confined, so far as the Union is concerned, to one Province. In this Province the production of wine in 1909 was 27,302 leaguers, and in 1911 no less than 58,966. The former year was, however, a notoriously bad year for grapes. The quantity of wine produced in 1908 was 42,433 leaguers, and in 1904 it was 44,655 leaguers. In 1912, owing to another bad season, the quantity diminished again. For the same years the brandy produced amounted to:—

| | 1904. | 1908. | 1909. | 1911. |
|---|---|---|---|---|
| Leaguers ... ... | 12,067 | 9084 | 5274 | 4894 |

We can lay claim to having greatly increased the quality of both our wine and our brandy, but the increase in quantity of wine has barely kept pace with the increase in population, while the production of brandy has decreased enormously. We are catering for internal consumption only.

It seems to the writer that there would be real progress in the viticultural industry only if we should be in a position to create an export trade. But what are the prospects of an export trade? It may be that our legislation regarding adulteration will so assist to improve our brandy that this product may obtain recognition oversea for quality and purity; it may be that sentiment and tariff legislation will give us a favoured position in the United Kingdom for our wine; it may also be that for a particular class of wine, such as sweet wine, we will be able to find a market beyond our shores; but, on the whole, the chances of exportation seem problematical. Experimental shipments of wine have repeatedly shown that at the cost at which we produce and the prices which protection enable us to obtain in this country, we cannot hope to compete with European countries or with Algiers in the classes which they principally manufacture, such as light wines, sherry, and port. Again, we have built up a very remunerative and successful trade in fruit, which returns far more than the products of the vine per given area, and it is just in the viticultural area that fruit growing has and will always hold the premier place in South Africa. All these factors point to no greater extension of the viticultural industry than in proportion, at best, to the increase in our European population.

### FRUIT.

Far different is it with fruit. We have a most favourable climate, suitable soil, and regular rainfall fro deciduous fruit in the south-western districts of the Cape. We produce the finest pears in the world. We have an expanding oversea market. There is a splendid field for dried fruit, an industry which we have only begun to develop. We have in many parts of the Union large areas most suitable for citrus fruit and pineapples, in which two classes our export trade will chiefly develop.

Our exports since Union were:—

| | 1910. | 1911. | 1912. |
|---|---|---|---|
| Packages ... ... ... | 200,000 (approx.) | 234,208 | 296,963 |

Concurrently with the development of the export trade, great progress has been made in the last few years in the planting of the best varieties and in grading and packing both for the home market and for export.

Our importation of jam decreased from 2,243,361 lb. (value, £37,667) in 1910 to 1,778,457 lb. (value, £33,994) in 1912; and of dried fruits of the varieties which we can produce from 2,616,506 lb. (value, £40,070) in 1910 to 2,375,417 lb. (value, £42,021) in 1912; while our production of the latter amounted to 6,743,073 lb. at the last census-taking.

### SUGAR.

True progress in the production of sugar in this country dates really from 1908, although the commercial cultivation of the sugar-cane commenced in Natal about fifty-five years ago. The following figures show the strides made in production from 1908 to 1911:—

| | 1908. | 1909. | 1910. | 1911. |
|---|---|---|---|---|
| Tons (long) ... | 31,999 | 77,491 | 84,437 | 92,000 |

This product has recently received greater consideration as regards rail carriage, and the consequent greater local consumption

of the South African article is testified to by the facts that 170,568 tons were conveyed per rail in 1911 and 214,537 tons in 1912, and that the importation of sugar declined from 36,482 tons in 1911 to 19,385 tons in 1912. It is worthy of note in this connection that the importation of golden syrup increased from 9,542,336 lb. (value, £91,448) in 1910 to 12,291,677 lb. (value, £117,681) in 1911 to 14,505,937 lb (value, £137,377) in 1912. This is something for our Natal friends to ponder over. In this product alone there seems to be a considerable opening.

### AGRICULTURAL MACHINERY AND MANURES.

There are two items in our imports which are sure indications of improved methods and expanding production, namely, the greater use of machinery and implements and of artificial manures, while at the same time the consumption of South African guano has increased. The values of the imports for the years since Union are:—

| | 1910. | 1911. | 1912. |
|---|---|---|---|
| Agricultural machinery and implements ... | £623,561 | £658,694 | £741,655 |
| Artificial manures... ... | 91,841 | 102,724 | 124,511 |

The trade statistics for the first five months of the present year show a backward tendency in several respects, but if the statistics for the current year were to confirm the indications of the first five months, such as greater importation of grain and butter, smaller imports of agricultural machinery, and a falling off in exportation of agricultural products, the figures quoted in this article are abundant proof that the set-back in these respects is temporary and attributable to the effects of the almost unprecedented drought of 1912.

### FOOD AND DRINK IMPORTS.

Comparing next the "food and drink" imports for 1910 and 1912, we obtain further evidence of agricultural prosperity. The total imports under this head amounted to—

| 1910. | 1911. | 1912. |
|---|---|---|
| £5,934,794 | £6,336,262 | £6,359,404 |

Superficially regarded, it may be thought that the increased imports mean decreased production. If the details making up these totals be analysed, however, the following position appears, comparing the principal items for 1910 and 1912:—

| Increases in Imports (2 years). | |
|---|---|
| Butter and cheese ... | £109,189 |
| Beans and peas ... | 15,943 |
| Eggs ... ... ... | 19,823 |
| Meat, fresh and frozen | 59,505 |
| Meat, preserved ... | 29,796 |
| Milk, condensed ... | 72,477 |
| Spirits, potable ... | 26,093 |
| Syrup, golden ... ... | 45,929 |
| Tea ... ... ... | 47,337 |
| Potatoes ... ... | 25,075 |
| Vegetables, preserved... | 13,326 |
| | £464,493 |

| Decreases in Imports (2 years). | |
|---|---|
| Flour and wheat ... | £558,489 |
| Fruit, preserved ... | 2,186 |
| Jams and jellies ... | 3,673 |
| Sugar ... ... ... | 133,685 |
| Wines... ... ... | 2,538 |
| | £700,571 |

Besides the above increases in articles of food and drink, there are increases in products which we do not produce, of which coffee alone accounts for a rise from £517,146 in 1910 to £807,253 in 1912, and chicory from £15,683 to £26,010, that is, £300,000 for these two articles alone. Rice accounts for a further £113,000, and fruit juice and cordials for £5000. These increases are doubtless due to greater purchasing power of the people. We have evidence, therefore, of—

(*a*) greater production of foodstuffs on the whole;
(*b*) decreased production of some foodstuffs owing to drought;
(*c*) greater importation of foodstuffs *not* produced here, owing to trade prosperity;
(*d*) greater importation of foodstuffs produced here owing probably to the same cause as well as to drought.

### VALUE OF ANNUAL PRODUCTION.

The writer has essayed a rough calculation—an estimate only is possible—of the value of the increase of all farm animals and products during the year ended 30th April, 1911, taking the census figures for that year as correct, although in several respects they clearly understate the true position. This value amounts to the respectable total of £37,000,000.

### SUMMARY.

The export of wool, our chief pastoral product, has increased from 121,668,034 lb. in 1910 to 161,974,684 lb. in 1912, or 33 per cent. in two years, and at the same time the production per sheep has increased by nearly 1 lb. in five years.

Angora goats have increased in eighteen months from 4,275,335 to only 4,395,101, but owing to the mohair market being a limited one, much expansion in this industry cannot be looked for.

A large number of cattle and sheep have been lost on account of disease and drought.

Dry seasons principally caused a rise in the importation of butter from 3,606,153 lb. in 1910 to 4,925,188 lb. in 1912 and of cheese from 4,650,984 lb. to 5,165,715 lb. in the same period. Notwithstanding the drought and the failure of a few co-operative creameries, the dairy industry is advancing.

The production of ostrich feathers increased from 741,000 lb. in 1910 to 826,000 lb. in 1912. The increase between 1909 and 1912 was 50 per cent., at enhanced value. The prosperity of this industry seems assured.

Horses have increased from 449,539 in 1904 to 719,414 in 1911, and the quality is improving at a satisfactory rate; but the number of mules has decreased 30 per cent. in the same period notwithstanding great demand and exceptionally high prices.

Pigs have increased from 679,084 in 1904 to 1,081,600 in 1911, but greater attention to their breeding is required.

Poultry has increased from 6,312,446 in 1904 to 10,533,909, but the importation of eggs has risen by 25 per cent. (or 3½ millions) between 1910 and 1912.

The quantity of mealies produced rose from 4,077,428 muids in 1908 to 8,632,516 in 1911. Drought has seriously affected the production in the past two years, but the area under cultivation for this cereal is extending rapidly and the outlook is most promising.

Between 1908 and 1911 the quantity of wheat produced increased from 1,150,000 to 1,810,315 muids—nearly 60 per cent. We seem to be within sight of growing sufficient for home consumption.

Oats and barley also are produced to a larger extent.

The production of tobacco shows an increase from 12,112,565 lb. in 1904 to only 14,961,199 lb. in 1911, but there is satisfactory improvement in the quality.

More wine is being produced, the figures being 44,655 leaguers in 1904 and 58,966 leaguers in 1911, but the production of brandy has declined from 12,067 leaguers in 1904 to 4894 leaguers in 1911. The quality of both these beverages has greatly improved.

The fruit industry is developing at a remarkable rate, and the export trade is healthy and hopeful.

The production of sugar is making rapid strides. Rail facilities have had a beneficial effect. The production of golden syrup seems to require more attention.

The value of the production of farm live stock and products for the year 1911 was about £37,000,000.

# Lamziekte.

By William Robertson, M.R.C.V.S., Acting Director of Veterinary Research.

Of all the diseases affecting horned stock in the Union none are more puzzling in their behaviour than the one known as lamziekte (now more generally termed gal-lamziekte) which has come into prominence during the past decade and bids fair to ruin ranching and cattle rearing in otherwise suitable areas.

Lamziekte is apparently not a new disease in South Africa, as in records of over a century ago reference is made to it; thus, in 1805, in the time of Commissioner Van der Mist, it was reported by a commission sent by him to visit the farmers in the Districts of Wellington, Kimberley, and as far north as Calvinia. On this journey the presence of lamziekte was noted amongst the cattle of fifteen different owners, and Dr. Lichtenstein, in 1803, describes a disease identical with our lamziekte in the Goudini District of the Cape Province.

The next information about the existence of this disease in the Cape Colony is contained in the "Settlers' Guide to the Cape of Good Hope and Natal," published in London in 1858. In December, 1882, Hutcheon first met with the disease in the Eastern Province, and in his report for 1884 he describes it on the Kaap Plateau, and in 1903 he wrote his last work on lamziekte, which will be alluded to in the paragraph dealing with the nature of the disease.

## Historical Notes, Geographical Distribution and Spread of the Disease.

Lamziekte has been reported to exist in the following districts:—Cape Province: Mafeking, Vryburg, Taungs, Kuruman, Barkly West, Kimberley, Hay, Herbert, Campbell, Gordonia, Kenhardt, Albany, Bathurst, Uitenhage, Port Elizabeth, Humansdorp, Somerset West, Somerset East, Bredasdorp, Swellendam, Mossel Bay, Riversdale, Peddie, Alexandria, Graaff-Reinet, and Van Rhynsdorp.

Very probably it exists in all the western districts of the Transvaal Province, as cases are common in Bloemhof, Lichtenburg, Wolmaransstad, and Christiana; while in the Free State, Boshof, Hoopstad, Bloemfontein, Fauresmith, Kroonstad, and Jacobsdal are known centres of the disease. During the last two years lamziekte seems to have spread in the western districts of these Provinces, cases occurring on farms previously regarded as free.

In Bechuanaland the Kaap Plateau has been regarded as its home from which it has gradually spread, but, curiously enough, the bushveld of that country and the adjoining Transvaal are clean as yet.

In the Cape Colony it was first noticed in the Alexandria District about forty years ago, and from the coast it has gradually spread inland towards Grahamstown, and it is generally stated that this disease appeared in the coast belt with the advent of the transport riding about forty years ago, and in the Humansdorp District lamziekte is said to have made its first appearance after the big fire in the sixties when the sour bush invaded the sweet veld and ruined the grazing.

On the whole it would appear that this disease has, within the past five years, shown a most marked tendency to spread, not only to new farms in the disease area, but into hitherto clean areas themselves, and this without any movement of cattle.

## Description of the Disease.

Two distinct forms or degrees of this disease are generally met with. These may be defined as acute and chronic.

*Acute form* may vary in intensity.

Frequently the animal is found dead in the morning, having, in the case of a cow, given her usual quantum at milking time and been regarded as in perfect health by the herd, or is turned out in the morning all right and found dead on the veld when searched for in the evening, or the case may linger on for from two to three days to about a week, and, in rare cases, for a longer period. Then the animal is noticed to lag behind when the herd is being driven, and, when grazing, is found separated from the rest. When examined, the affected animal is noticed to have a peculiar stiff waddling gait, walks with short stiff steps and an arched back, and when it lies down does so with a drop instead of the leisurely way a healthy beast goes to rest. There is frequently a quivering noticed in the muscles of the flank and shoulders. When the beast first lies down it remains in the normal position, viz., flat on the chest with the forelegs tucked in (see plate No. XLIX), but after a while gets on to the side with all four legs stretched out. Frequently the head is turned towards the flank (see plate No. LI). The sick animal may be quiet or there may be spasmodic attacks of struggling. There may be other sets of organs affected. In this disease the throat and muscles of

swallowing become paralysed, and such animals may die with a bolus of food in the throat. Frequently in such a case the tongue will be noticed to hang from the side of the partially opened mouth.

In observing a number of acute cases of lamziekte many modifications of the above symptoms may be noticed varying in degree and intensity. But the most prominent are: first, stiffness; second, inability to rise; third, general and progressive paralysis; in a certain proportion of cases head symptoms are noticed, the brain appears to be affected, and the animal has a wild staring appearance, and evidently has no consciousness of its acts.

*Chronic Form of Lamziekte.*—Here the disease runs more the same course, only the symptoms are developed much more slowly, and frequently the sick animal lasts for weeks, unable to rise, but able at first to eat and drink if food is supplied, and even able to drag itself about in search of grazing.

At first it stands when lifted—finally, either the paralysis spreads from the limbs to the whole body and kills the animal or it may eventually recover.

In areas where lamziekte is rife, all stages of the disease may be observed, and frequently cattle evidently pass through a mild attack of the disease without even going down. The main symptom in these cases is stiffness in gait, particularly noticeable when the animal rises. The back is arched. There is much loss in condition. Cows give a much diminished milk supply and the duration of such a mild attack may be weeks or months.

It should be noted that in all the forms or degrees of lamziekte infection there is a total absence of fever and the dung and manure may be passed normally to the last. I think the dryness in the dung often noticed is simply due to the animal constantly lying and the faeces get dried off when they accumulate in the rectum.

## POST-MORTEM APPEARANCES.

It may be stated here that there are *no definite characteristic post-mortem appearances in this disease.*

A more or less degree of inflammation of the digestive tract, with acute inflammation of the lining of the fourth stomach, is the most constant change met with, but several hundreds of most careful post-mortems have shown that no one organ is specially affected as in the case, for example, of rinderpest, meltziekte, or lung-sickness.

Some observers allude to the increase of fluid in the spinal canal, but many post-mortems tend to show that this can vary within wide limits even in the case of healthy stock, and the enlarged gall bladder generally noticed is more the result of the animal having been lying for some considerable time than of the disease itself.

Dr. Theiler sums up the diagnosis of lamziekte as follows:—

"Diagnosis of lamziekte.—Having stated that the post-mortem examination does not show any characteristic lesions and that the miscroscope does not reveal any organism or any typical changes, we are entitled to the statement that from a dead animal no definite diagnosis of lamziekte can be made unless we know the history of the case during the life. This point is in contradistinction to the majority of all other diseases, e.g. lung-sickness, East Coast fever, horse-sickness, etc. *The main characteristic seems to be the absence* of typical

characteristic lesions and a negative post-mortem report. Accordingly, for our diagnosis we have to completely rely on the history of the living animal, on the knowledge of the conditions under which it has contracted the disease, with due reference to the locality in which the animal is found, viz., whether in a lamziekte area or not. When weighing out all these points we may then arrive at a definite conclusion. The animal with its definite course of symptoms during sickness and the negative post-mortem reports point to the diagnosis of lamziekte."

*Plate No. XLVIII.* *Photo by D. T. Mitchell, M.R.C.V.S.*
Mild Case of Lamziekte, showing stiffness in hind legs.

## HOW IS LAMZIEKTE CONTRACTED?

Experiments were made which consisted in running muzzled and unmuzzled cattle on lamziekte veld; out of a lot of 100 cattle, fifty muzzled and fifty unmuzzled were exposed to infection for a period of eight months on a badly infected farm. Of the unmuzzled lot, eight contracted lamziekte, while out of the fifty muzzled not one animal became infected; therefore it is pretty evident that the disease obtained entrance by the mouth, and we must suspect the veld, as *both lots drank at the same water*. This experiment also serves to exclude the theory that ticks or biting flies are the means of transmitting the disease.

Many experiments have been undertaken, having in view the transmission of lamziekte from a sick to a healthy beast. Every tissue and fluid in the body has been used both by inoculation and drenching, and, so far, every experiment has been negative. (Any person

interested in this side of the question should procure a copy of Dr. Theiler's pamphlet ".Facts and Theories about Stijfziekte and Lamziekte," which can be obtained on application to the Laboratory, Onderstepoort.) Experiments to produce the disease by means of ticks from lamziekte cattle also failed in every instance. It is this fact, viz., an inability to produce cases at will, which renders the study and investigation of the lamziekte problem so difficult. Were we able to produce only one case by any definite means, our work would be very much simplified. *Therefore we may state that, up to date, all means to communicate the disease lamziekte from sick to healthy animals have proved impossible.*

### CONDITION OF CATTLE AFFECTED.

Lamziekte principally attacks cows heavy in calf or which have just calved. This seems to be universal. Oxen and dry stock are not so susceptible, and a herd will often be practically denuded of milk cows without a single case occurring amongst the oxen. It is also noticed that the fattest cows and heaviest milkers are amongst the first to become affected.

In severe outbreaks when oxen become affected they do not seem to possess any greater resistance to the cause of the disease than cows, dying at the same time and to the same extent as the latter.

The percentage of animals affected varies in the same herd in different seasons, and frequently when two owners' cattle are running together the cases of disease will only occur in cattle the property of one owner. It is also noted as a common feature that this disease can entirely leave a farm for one or more seasons.

### THEORIES AS TO THE CAUSE OF LAMZIEKTE.

These, as can be imagined, in dealing with a disease so widespread and different in characteristics, are many and varied, and may be classed under several headings:—

(1) The infection theory.
(2) The poisonous plant theory.
(3) The want of nutrition or some essential element in the food.
(4) The accumulative vegetable poison theory.

I will deal with these shortly in their order.

#### *The Infection Theory.*

By an infectious disease we understand one produced by some organism, bacteria, or parasite such as redwater, rinderpest, or anthrax (meltziekte), and such contagious diseases may be directly communicated from animal to animal; thus lung-sickness can only be spread by direct contact with the sick beast, while rinderpest, anthrax, etc., can also be spread by means of flesh, soiled litter, etc., and all infectious diseases tend to spread in a very rapid manner. Were lamziekte to be due to an infection like any of the diseases mentioned, it would have spread by this time all over the subcontinent.

It has been known for over one hundred years in the Cape Province, yet it is still confined to certain well defined areas. Again, all the attempts to communicate the disease from sick to healthy cattle have failed, and all attempts to demonstrate an organism or parasite of any kind in the blood and tissues of a lamziekte beast have also proved negative.

I have repeatedly drenched healthy cattle with the stomach and intestinal contents of lamziekte cattle, as well as the "pens mist" and bones, and have never yet been able to transmit the disease.

If lamziekte were caused by a definite micro-organism, we would have expected the muzzled as well as the unmuzzled cattle in the experiment described to have contracted the disease. They were herded together and watered together. and the muzzles can hardly be credited with keeping back any micro-organisms, as the article in question did not prevent the wearers from sniffing and licking the veld with their tongues, but were simply, by these means, prevented from feeding.

*The Poisonous Plant Theory.*

This is a very widespread belief amongst farmers and stockmen, and at first the results of the muzzling experiment lent colour to their

*Plate No. XLIX.* *Photo. by D. T. Mitchell, M.R.C.V.S.*

Early Case of Lamziekte.

arguments, and this theory would certainly explain many of the curious characteristics of the disease. Dr. Theiler pursued this theory with much care and detail, and, in conjunction with Mr. Burtt-Davy, travelled over large parts of the lamziekte area, scanning the veld and meeting farmers and making a collection of the plants pointed out as likely to be the cause of the disease.

"In travelling from farm to farm and speaking to a great number of the farmers, we came to the conclusion that if a definite poisonous plant would be the cause of the disease, it could not have escaped the notice of some farmers during the many years the disease was known and during such a period as the last two years when the disease was more prevalent than at any other time within the recollection of man. All the poisonous plants known to exist in South Africa were found out by farmers and before experts began to investigate them, and when there was doubt, the doubt was only about the exact species out of a number of plants which experience had connected

with a certain disease. I do not think half a dozen farmers pointed out the same plant to us as being responsible for lamziekte. Another fact speaks against a poisonous plant, viz., that by feeding of 'pens mist' we were never able to produce the disease. It may rightly be expected that in some instances some material of the plant would be left over in the rumen. *The poisonous plant theory must accordingly be given up.*" (Theiler.)

*The Want of Nutrition Theory.*

This is a theory brought forward by many farmers, and it is indeed capable of explaining many observations in a satisfactory manner. It is to the effect that there is something wanting necessary for the nutrition of the animal trying, of course, instinctively to find that substance. The fact that animals fed on cultivated foodstuffs while running on lamziekte veld do not contract the disease so rapidly is considered to be in support of this theory, the animal obtaining the substance that is required from the food and which is not present in the grass. This was also the objection made to our muzzling experiments. It was pointed out that the muzzled animals had not fed on the innutritious grass of the veld over which they are running, but were fed on the grass from Pretoria, and for this reason remained healthy. This objection would, of course, hold good as soon as it can be shown that the nutrition theory explains the rest of the observations satisfactorily.

The reason why animals that come from a healthy area do not contract the disease so readily is said to be that such animals still retain a considerable amount of that material in their system which is gradually utilized and reduced as time goes on. The main support is found in the observation that the disease is principally found in dry and hot years when the grass had but little chance to develop, and, naturally, is thought not to have reached the state of maturity that is wholesome for cattle. The fact that farms on sweet veld show no disease, or to such lesser degree, could also find an explanation in this way. The observation that animals, such as heifers and tollies, and cows and heifers in calf, were most liable to sicken, also found a satisfactory explanation. Growing heifers and tollies did not obtain sufficient nutrition for their growth, and in an animal in or with calf that material was withdrawn by the growing calf. That sucking calves did not contract the disease showed that they obtained the nutritious substance from their mothers through the milk. The objection to this explanation is, how can the calves take away that which the mothers do not obtain? If there is a lack of nutrition it must be in the food. Cows fail to obtain it, and what they do not obtain they cannot give to their calves. Of course this objection is met by pointing out that there is not a complete lack of the necessary material, but only a shortcoming. Admitting this to be the case, then it is still a difficulty to explain why fully developed calves are born, and the calf, as long as it is on the udder of its mother, is healthy, therefore obtaining the full quantity of nourishment required for its growth. The main objection lies in the fact that the fattest animals and the best milkers are more subject to the disease than those in such condition. Whatever substance would be lacking in the nutrition, we could not understand that with a lack of something of vital necessity such a good condition could be obtained. It would be contrary to all physiological knowledge. A good condition of an animal is the result

of all foodstuffs, organic or inorganic, being present and in proper proportions; the lack of one of them would never allow the animal to get into a first-class condition.

There is another difficulty to explain, viz., the recovery of the animal. If something is missing, how can an animal recover after it has sickened without that something being supplied? Nothing additional is supplied, as the recovering animals remain under the same conditions under which they contracted the disease.

The want of phosphates: these can be considered also under this heading. We have shown that the want of these minerals can produce a disease, but it does not resemble our lamziekte. There exists, how-

*Plate No. L.* *Photo by D. T. Mitchell, M.R.C V.S.*

Advanced Case. Animal in last stage, unable to lift head.

ever, the possibility that there is indeed a want of phosphates in the soil and accordingly in the food, but the shortage as such is not the direct cause; there is still sufficient material for the animal, but it may indirectly contribute to the cause of the disease in some way or another. These points require naturally extensive comparative chemical analysis of soil and plants.

The want of nutrition theory does not explain one important fact, viz., the influence of trekking. The moving and driving of cattle stops the disease. To understand this we would have to accept that by *trekking every time fresh and healthy pasture was found, which is decidedly not the case.* It fails completely to explain the fact that animals, oxen, and cows, which are worked hard and whose food supply is only the grass of the lamziekte veld, are less susceptible. Hutcheon,

who tried to meet this objection by his want of phosphates theory, says that in working animals the increased metabolism liberated the phosphorus required for the nutrition of the animal and thus meets the demands. But he failed to explain or show how phosphates get into the muscular system when they are not present in the food which primarily was accused to be lacking in them. The main support, of course, for the want of phosphate theory was the observation that in all experiments where bonemeal was supplied at short intervals the disease was not noted. This fact cannot be overlooked, but will find a different explanation. It will, however, be wrong to conclude that because the administration of the phosphates prevents the disease the want must be the cause of it. To illustrate this fallacy I have only to refer to the drugs which have preventive effects, such as, for instance, Cooper's Dip has on geilziekte in sheep: the protection is apparently due to the presence of arsenic. But nobody has yet drawn the conclusion that the want of arsenic in the system is the cause of geilziekte in sheep.

*The want of nutrition theory is therefore not capable of explaining all the observations connected with lamziekte.*

### *The Accumulative Vegetable Poison Theory.*

Above is the theory advocated by Dr. Theiler as to the cause of lamziekte. It was advanced after most careful deliberation with the more prominent farmers in the lamziekte area, and is worthy of careful consideration by all thinking farmers and stockmen.

As these few notes are necessarily short and intended eventually for general circularization amongst farmers, I can only deal with this theory here on broad lines, and any one interested in lamziekte, and particularly as to the suggested cause, should obtain a copy of Dr. Theiler's work on the subject alluded to previously.

Briefly, Dr. Theiler explains the cause of lamziekte as follows: Lamziekte is a disease principally of the muscular system, and is caused by a toxin or poison which collects there and is obtained by the animal from certain grasses which have these poisonous properties formed in them at certain seasons, or as the result of certain conditions of weather or veld. This poison has to be taken in by the animal for some time before any symptoms or signs are shown, and the varying amount which can be taken in by a beast in a given time accounts for the many and varied symptoms and conditions (within broad limits) noticed in cases of lamziekte.

If this theory is considered in all its bearings, it will be found that it affords one explanation for many of the facts known about the appearance and cause of the disease in question.

Thus it will explain why suckling calves never get it when on mother's milk, and why cattle moved into lamziekte veld do not at once contract the disease. Again, in the case of oxen, these are known to be more resistant than cows, because the former are worked, and working increases the so-called metabolism (or change in the muscular tissues produced by oxidation), and thus helps the beast to get rid of the poison. Take, as an example of this, a man under the influence of alcohol or opium: exercise is prescribed here so that the body may absorb oxygen and burn up the poison, and it may be this oxidation produced by exercise which causes some farmers in the lamziekte area to recommend "trekking" when the disease appears.

I have seen this stop the animals dying even when the animals were moved rapidly to another area in the lamziekte belt, so that it could not be the change of veld (both being alike) which stopped the disease. Again, it is a well recognized fact that cows in the height of condition are the earliest affected, and it is a fact also that fat animals do not move about so much as lean and that the oxidation in their tissue is more or less slow, therefore the absorbed toxin or poison from the grass is not so readily got rid of. Again, take the example of alcohol: it is the spare active man who can stand the most, as his tissues are active, and get rid of it quickly.

It has often been stated, with a considerable degree of truth, that inoculation with redwater vaccine, anthrax vaccine, etc., has arrested the diseases on certain farms, and this can also be explained by Dr. Theiler's theory; when a vaccine like the above is injected

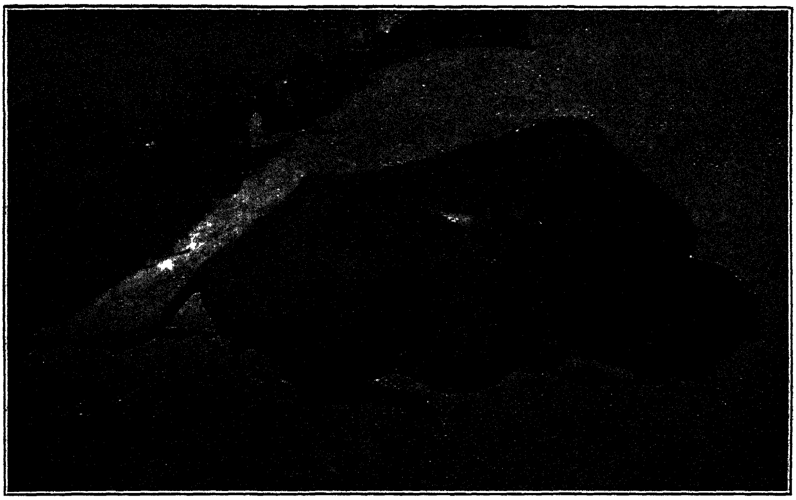


*Plate No. LI.* *Photo by D. T. Mitchell, M.R.C.V.S.*

Advanced Case of Lamziekte.

into an animal you get a rise in temperature and an oxidation of the tissue and the distribution for the time being of the accumulated poison on the animal's system, and it was generally noticed that after the rinderpest bile inoculation, lamziekte practically disappeared for a time from the affected areas in the Eastern Province.

Briefly to summarize: Under certain conditions of climate and veld a poison is developed in the veld vegetation. This, when eaten by the animal, does not at once act, but gradually accumulates in the muscular system and suddenly produces its effect. In some cases the nervous system may be involved, and this accounts for the sudden onset of the disease, the paralysis of the muscles of the flank and back, causing the inability to rise and the subsequent paralysis of the muscles of swallowing. When the nervous system is invaded, we get the twitching eye and the twisted neck, with the convulsive movements of the legs.

If the matter be carefully considered it will be seen that this theory fits in with most of the facts we know about the disease, and the remedy naturally suggests itself: find something to eliminate or cause the body to throw off the poison, or in default of that something which can be given to the animal to neutralize or render the poison inert. Many farmers have doubted the idea of a cumulative poison, that is a poison which can be taken into the system without effect for some time and only shows itself quite suddenly when the system is charged with it. We have an example in strychnine: a man can take, say, Easton's Syrup (which contains 1-32nd of a grain of this drug to a teaspoonful) for a long time without any effect noticeable, then quite suddenly he will exhibit the muscular spasms associated with poisoning by that drug.

That poisons can develop in harmless vegetation under certain circumstances is a well-known fact. Take the example of a green forage plant called "sorghum"; this is an excellent feeding stuff when fresh, but when wilted develops prussic acid, a most fatal poison; or "Java beans," which are a fine foodstuff when gathered properly, but if harvested unripe can and do produce poisoning. That brisk work can eliminate poison from the system is also an accepted fact; a walk, for instance, raises the temperature and causes perspiration, and when we perspire the changes are not only on the surface of the skin, but through all the cells of the body; consider the effects upon a cold of a good sweat in getting rid of the infection from the system and the value of Turkish baths in rheumatism. Again, the ingestion of good nutritious food raises the bodily temperature and causes oxidation in the tissue; this may explain why lamziekte can be held in check by the giving of a supplementary ration of forage, mealies, etc.

I wish to emphasize these arguments, as they appear to me one of the most satisfactory theories yet brought forward.

## PREVENTION.

At present we do not know of any simple preventive or any certain cure. If Dr. Theiler's theory of a cumulative poison fixed in the cells of the muscular tissue is correct, medicine which simply acts upon the digestive tract like purgatives can be of little value. This poison can, in such a case, only be removed by increasing the activity of the cells themselves, and though there is little hope of a cure, we may hope for a preventive. Dr. Theiler inclines to the belief that this will be found in bettering the conditions of food supplies; in short, by the providing of artificial food by means of ensilage, breaking up the veld, and cultivation and change in the pasture rather than by any form of inoculation or dosing with drugs. As our knowledge so exists at present, I regret to say I am not in a position to give any certain method for the prevention of lamziekte beyond what I have said above, viz., trekking and artificial feeding of stock as soon as they show the depraved appetite so certain a sign of the onset of this disease.

Up to the present we have been working in the dark, but nevertheless an immense amount of experimental work has been carried out by the Division. The mass of evidence and the major results of the experiments have been negative, but all of value. The exact nature of the poison must be ascertained, when it will be a fairly

easy problem to find something to counteract it or render it inert; this will be the business of the Physiological Chemist which the Department is obtaining from Europe.

Many farmers pin their faith to a lick of salt, lime, saltpetre, etc.; personally I have had fair success in the Eastern Province with bonemeal. When given to the cattle the results were more than a coincidence, and many farmers there still stick to that as a reliable preventive of the disease.

While working with the disease in the Eastern Province the writer at one time thought he had found the exact cause of lamziekte in the shape of a rod-shaped organism found in the walls of the gut in cases of the disease, as he found that solutions of this organism when grown for some time produced symptoms approximate to those of lamziekte when injected into clean cattle; when these latter animals recovered they seemed to resist the disease for a time. A number of cattle were then inoculated, and they also seemed to possess a stronger immunity to lamziekte than those not so treated. Up to the present the results have been contradictory, but this idea is being thoroughly tested this year in the Christiana and Bloemhof Districts; perhaps the reaction set up by the inoculation may set up some oxidation changes in the animal's system which may assist it to throw off the cumulative poison. (Over 1000 head of stock are being inoculated experimentally.)

### Experimental Work at present being carried out by the Division in regard to Lamziekte.

The experimental work in connection with this disease is much hampered by our inability up to the present to produce cases of lamziekte at will; we are thus reduced to waiting for veld infection to supply us with the cases for study; this, as can be imagined, circumscribes the area of our work considerably: several cases may occur in an area, and as soon as arrangements are made for the study of the disease in that form the cases often cease, and it is no simple job moving laboratory appliances and apparatus about the veld; besides, the inability to produce cases at will debars us from undertaking a study of the many recommended preventives. The work at present being conducted by the Division aims, in all cases, at producing a case of the disease; when we can do that we can concentrate the work at Onderstepoort and think about methods of prevention and cure.

Dr. Theiler's observations and experiments have led him to believe that the infection of lamziekte was picked up on the veld, probably a continued ingestion of certain injurious vegetable substance being the originating cause; with this object in view certain extensive and detailed experimental work has been started in various parts of the country, viz.:—

Vryburg, Cape Province.
Kaffraria, Transvaal.
Immigrant, Orange Free State.
Lower Albany, Cape Province.

I will glance at each set of experiments quite briefly:

*Vryburg Experiment.*—Here at a notorious farm called Armoedsvlakte certain cattle have been grazed over the infected area, and in

addition certain plants, regarded as suspicious by the Government Botanist, are hand-gathered and fed to tethered cattle, which are forced to submit to one plant in each case. In addition, the lamziekte camp has been fenced down until the disease showed itself in a 100-acre paddock; this has now been fenced into five, so that the actual area affected with the disease may be circumscribed, then every stick and herb can be carefully examined.

Some doubt and some derision has been cast upon the separate grass feeding experiments, but this is quite uncalled for; we are working with an unknown disease and must approach the investigations from all sides. The feeding of individual grasses and plants is no easy task; the feeding, it must be understood, should extend over at least a clear year, and during many parts of the year in the Vryburg area, particularly during the drought of 1912, the vegetation completely disappeared and the experiment had to be suspended.

I have much hope from the fencing-down experiment, as there we may get the actual cause of the disease.

*Transvaal.*—Here the work is being conducted on a farm called Kaffraria, in the Christiana District, and as far as possible the Armoedsvlakte experiments are being duplicated; in addition, the suspicious grasses and plants selected as such by the Government Botanist are being planted in lands in acre plots, and in spring cattle will be tethered in these plots of suspected deleterious grasses and fed on them exclusively during the whole season.

*Orange Free State.*—Here at Bestersput, a farm near to Immigrant Siding on the Bloemfontein-Kimberley line, and long known to be badly infected with lamziekte, extended preparations are being made for the planting of suspected grass plots in readiness for the cattle feeding experiments in the spring. In addition, green veld hay and vegetation is supplied to a number of stabled animals as their only food (from a camp in which a number of control animals are running and in which the disease has shown itself). As soon as ever we get a case of lamziekte by the general hay feeding experiment arrangements will be made to start selective grass and plant experiments with the grass and plants found in the hay.

It is no light work planting and watering ten acres of planted vegetation, and the job has been a strenuous one.

*Lower Albany.*—Here at a farm, Manley Flats, on the Grahamstown-Kowie Railway, we run in a lamziekte camp thirty head of mixed susceptible cattle; from this camp is cut veld hay which is baled and sent to the Veterinary Laboratory at Grahamstown and fed exclusively to six kraaled animals.

In this district we are also conducting an experiment at Sevenfountains with exposing susceptible cattle in a lamziekte camp in order to differentiate between this disease and heartwater (two very often confounded).

In addition to these outstanding feeding experiments, we are conducting similar work at Onderstepoort, both with hay from Christiana District and from Bechuanaland. A very serious outbreak of the disease occurred at a grass veld farm in the Vryburg area, over twenty head of cattle dying there. I at once sent down men and suitable appliances to collect hay in the camp in which the animals were dying; this baled hay was sent to Onderstepoort and is being fed as an exclusive ration to twenty heifers.

*Other Experimental Work.*—Much of the inoculation work dealt with in previous reports is being repeated, but I would say here that with the exception of two suspicious cases amongst our stabled animals at Besterspūt, we have so far failed to transmit the disease lamziekte from one animal to another, and also failed to produce a case at will by any of our feeding experiments.

It can easily be seen how this is the first step in the investigation into the nature and cause of lamziekte, and until this is an accomplished fact the outstations must be kept on and the work will be carried on along the present lines.

# Turkish Tobacco in the Cape Province.

## CULTIVATION AND PREPARATION OF THE LEAF FOR MARKET.

By L. M. STELLA, Officer in Charge, Turkish Tobacco Experiments, of the Tobacco and Cotton Division, Pretoria.

### INTRODUCTION.

THE circumstances leading up to the cultivation of Turkish tobacco in the Cape Province and the subsequent history of the industry were set forth in an article appearing in the *Cape Agricultural Journal* of May, 1910. In order, however, to demonstrate the economic side of the industry, and indicate the lines on which progress has been made, the following brief summary is given:—

In 1905 the first experiments with Turkish tobacco were laid out in the Cape Province; since then the industry has made steady progress and has proved very remunerative. As with other new industries, the Turkish tobacco industry has seen many vicissitudes. There was some doubt in the beginning as to whether the venture would ever succeed. Recognizing, however, the latent possibilities of success in the culture of Turkish tobacco in the Cape Province, the Government engaged the writer's services to lay out experiments on private farms. During the 1906-7 season, six farms were selected in the French Hoek and

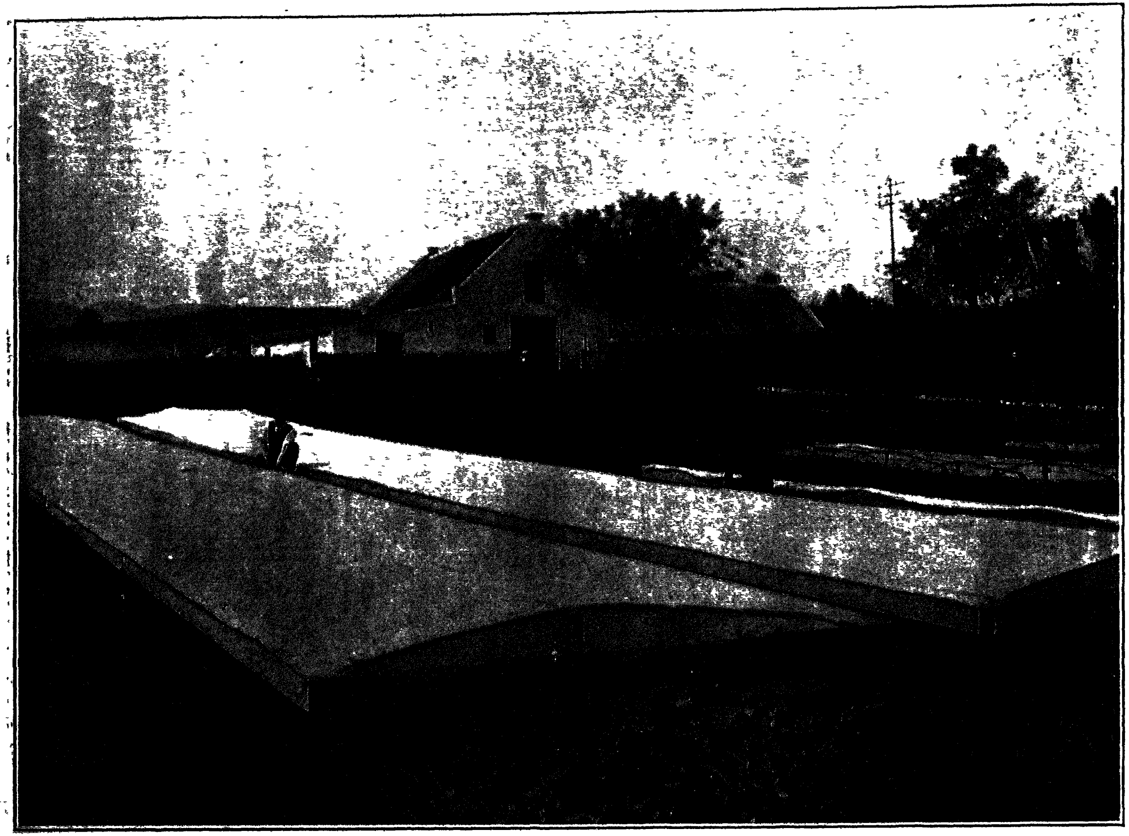


*Plate No. LII.* Turkish Tobacco Seed-Beds, Cape Province, showing cheese-cloth covering.

Groot Drakenstein Valleys. The area under cultivation comprised in all seven and a half acres, and the yield was 3000 lb. This tobacco was subsequently sold by auction at French Hoek, and realized an average price of 1s. 6d. per lb., which was a fair price, considering its immatured state and that the labour was raw and inexperienced, and that the manufacturers were unacquainted with the true value of the produce.

In 1907-08 the experiments were extended to several other districts, and a successful crop of 13,000 lb. was raised and sold by auction at French Hoek, realizing an average price of 1s. 11d. per lb.

In 1908-09 experiments were laid out at fourteen farms. Nearly seventy acres were put under cultivation, and an estimated crop of 35,000 lb. was anticipated, but, unfortunately, owing to severe drought and several pests attacking the plants, only 16,000 lb. were raised. The tobacco was sold by auction, and the average price realized was 2s. per lb.

In 1909-10 the industry saw marked progress, not only in the number of growers and the area under cultivation, but in the increased interest the industry evoked, as indicated by its extension to other districts in the Western Province. Eighteen farms were selected, extending over the Divisions of Stellenbosch, Paarl, Tulbagh, and Caledon. These plots comprised an area of one hundred and thirteen acres, and the total output was 56,000 lb. The immature tobacco was sold by auction; the average price realized was 2s. 1d. per lb.

In 1910-11 experiments were conducted at twenty-four farms; the area under cultivation, including previous growers, was 250 acres; the yield was 140,000 lb. The immature tobacco was sold by auction and realized an average price of 2s. 1¼d. per lb.

In 1911-12 experiments were conducted at thirty-two farms, the area under cultivation, including other tobacco growers, was nearly 400 acres; the yield was 250,000 lb. The immature tobacco was sold by auction, and the average price realized was 1s. 6½d. per lb.

The present year, 1912-13, shows experiments conducted at forty-two farms, and the area under cultivation, including other tobacco growers, comprises 525 acres.

It will thus be seen that the industry expanded and grew in popularity every year, and also that the prices obtained for the produce were, on the whole, satisfactory. This will be better seen by a glance at the following table:—

*Table showing growth of the Turkish tobacco industry.*

| Year. | No. of Farms on which Experiments were carried out. | Acres under cultivation. | Pounds Produced. | Average Price per lb. obtained. |
|---|---|---|---|---|
| 1906-07 | 6 | 7½ | 3,000 | 1s. 6d. |
| 1907-08 | 12 | 25 | 13,000 | 1s. 11d. |
| 1908-09 | 14 | 70 | 16,000 | 2s. |
| 1909-10 | 18 | 113 | 56,000 | 2s. 1d. |
| 1910-11 | 24 | 250 | 140,000 | 2s. 1¼d. |
| 1911-12 | 32 | 400 | 250,000 | 1s. 6½d. |
| 1912-13 | 42 | 525 | — | — |

It will be observed that the producer obtained fair prices for his leaf, and that the prices generally increased with succeeding years.

Circumstances which it is unnecessary to relate militated against the upward tendency at the last sale, and the average price fell to the extent of 6¾d. per lb., as compared with the previous year. This will prove to be the commencement of a crisis in the Turkish tobacco industry, and steps must be taken without delay to circumvent a set-back to the promising position it has hitherto occupied.

There is no doubt that the last tobacco sale was a great disappointment to the farmers. They have been frequently advised that the system of holding annual sales for the disposal of the leaf in an immature state was not the proper one. I advocated the formation of a Tobacco Growers' Association, and urged the absolute necessity of the establishment of a warehouse wherein the tobacco could be stored, not only for the purpose of passing the stage of ageing, but also to be manipulated and classified by experienced men in the trade. We do not attach blame to the manufacturers for giving low prices. The grower apparently is not aware of the amount of expense and trouble the manufacturer is subjected to in purchasing raw material, apart from the risk he runs owing to the possibility of the tobacco fermenting. He has to hire special accommodation for storing the tobacco, and engage the services of competent men to look after the stored tobacco for at least one year. Suppose that other produce, such as wine and cereals, had to be forced on to the market and sold in one day; the result would be disastrous; so it is with tobacco. If we compare the prices realized at the last sale with that of former sales, we estimate that the farmers lost more than £6000 by not having a warehouse to mature their crops in. The fact that the former sales were a success was undoubtedly due to the small quantity of tobacco offered, but with such a large quantity as the last crop, and especially considering its immature state, prices were bound to fall, but not because the supply exceeded the demand. It is evident that we have not yet reached the limits of the demand, which is estimated to be over half a million pounds at present. At the rate we are increasing the yield it will not be long before the full local demand is met and the position of the industry will be critical unless we have a warehouse from which we can put a matured article on the market, as is done in other parts of the world. We will then be in a position to export an article good enough to compete with that of other countries. The South African demand is insignificant when compared with the demand abroad. Our Western Province Turkish tobacco has been declared by manufacturers and connoisseurs to be the best ever grown in South Africa, notwithstanding that thus far our leaf has never been properly treated and matured in a warehouse.

### The First Turkish Tobacco Warehouse in the Western Province.

After the disappointment of the results of the 1912 sale, the tobacco growers realized their position, and steps were taken almost immediately to convene a general meeting of growers with a view to forming a Tobacco Growers' Association. This was held at Paarl on the 20th June, 1912, and a committee was appointed to draft a prospectus. The first committee meeting was held at Stellenbosch on the 6th of July, 1912, and at two subsequent meetings the rules and regulations were drafted. After careful consideration, it was decided to form a company with limited liabilities, the name of the company to be "The Western Tobacco Growers' Company, Limited." The

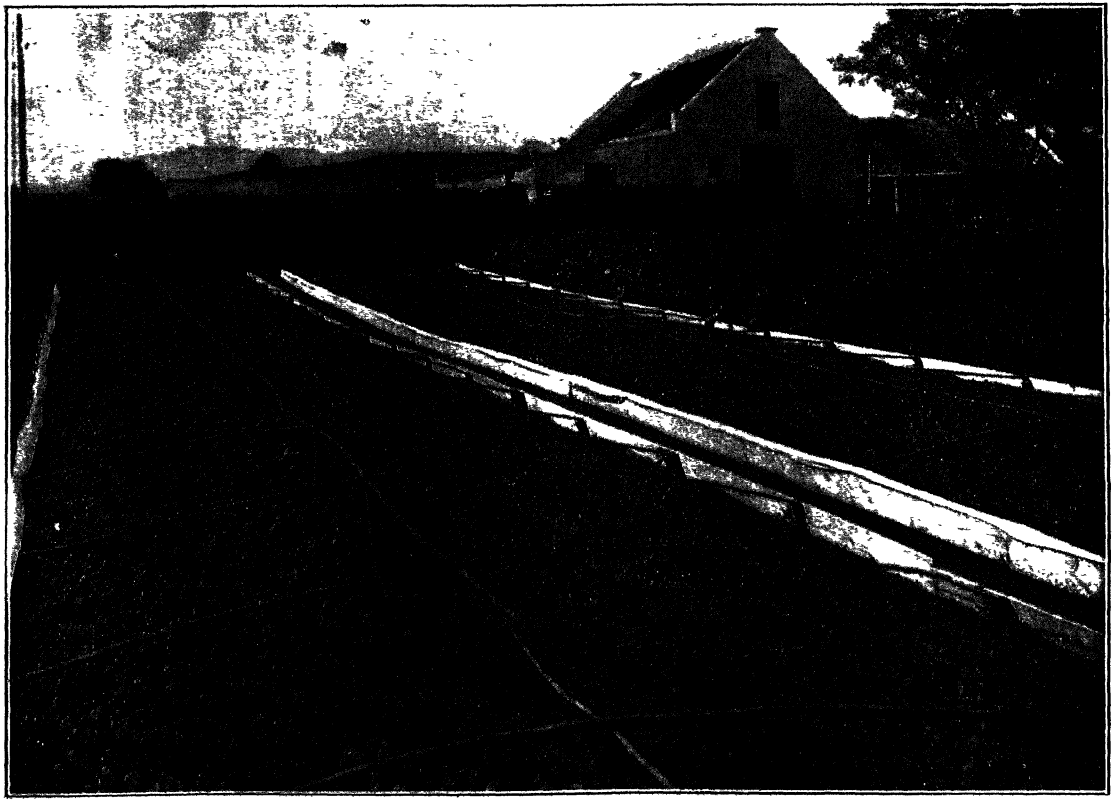


*Plate No. LIII.* Turkish Tobacco Seed-Beds, Cape Province.

company has since been floated, and the necessary steps have been taken to open a warehouse. With good management and a thoroughly experienced man in charge of the warehouse work, the company should be successful. This offers a solution to the question of profitably marketing Turkish tobacco.

### SOILS SUITABLE FOR TURKISH TOBACCO.

Turkish tobacco has been experimented with on different kinds of soils. The soils which thus far have given us the best results are those of a reddish, sandy nature, with about 30 per cent. to 40 per cent. of clay, and situated preferably on the slopes of the mountains. Decomposed granite soil formations also gave us excellent results. Heavy clayish and badly drained soils should be avoided, especially when situated in flats and surrounded with trees, as the plants are liable to be affected with mildew. Free circulation of air is very essential.

### PREPARATION OF LANDS.

In the Western Province, where the annual rainfall can be depended upon, virgin soils should be ploughed and allowed to lie fallow at least one year before being used. In April, after the first rain, the land should be reploughed to a depth of 10 to 12 inches. Three ploughings are recommended, and the soil must be brought into a fine tilth and deeply stirred. In the autumn the ground must be manured and the manure ploughed in. A few days before transplanting, the land should be reploughed and the surface smoothed by means of a harrow or roller. During the intervals of the ploughings the land should be kept scrupulously clean in order to starve any insects, particularly cut-worms, which cause great destruction to the plants after they are set out. It has been clearly proved that where-ever lands had been kept clean during the winter months very little trouble was experienced with insects; on the other hand, if the land had been allowed to become weedy great destruction by insects was experienced.

### MANURING.

Sheep or goat manure for Turkish tobacco gives good results, and whoever can possibly afford to give such manures to his tobacco lands need not hesitate in doing so, but as the plant food in the manure is not all readily soluble it should be applied at least three months before the plants are set out. The plant food then becomes available for the growing plant.

Several experiments were carried out with artificial manures in the form of superphosphate, sulphate of potash, and nitrate of soda, which also gave satisfactory results. The usual dressing in drills per acre wherever Turkish tobacco grows at present in the Cape Province is as follows:—

280 lb. superphosphate.
160 lb. sulphate of potash.
140 lb. nitrate of soda.

The drills are opened first to a depth of about seven inches by means of a small plough, the fertilizer is then pulverized well, the constituents mixed and applied in the drills almost immediately. The drills are then covered by means of a harrow, and planting operations can commence.

## SEED.

Owing to the lack of an experiment station, no steps have yet been taken to breed and select our own tobacco seed, consequently we have been compelled to import seed every year direct from Turkey. In several instances seed has been collected from the first crop raised and sown the following year, but with very poor results. The plants from such seed grow luxuriently, but, unfortunately, the quality deteriorates and lacks in aroma and flavour.

## TIME FOR SOWING TURKISH TOBACCO SEED.

From past experience we find that the best time for sowing the seeds for the Districts of French Hoek, Paarl, Wellington, Stellen-

*Plate No. LIV.*
Showing Dibbles used in transplanting Turkish Tobacco and table used in connection with the baling operation.

bosch, Worcester, Caledon, Tulbagh, and Cape, is from the beginning till the end of July, provided the seed-beds are well prepared and covered with muslin (see Plate LII). By these means plants have been raised within two months, whereas in some cases where the seed-beds were prepared and the seed sown at the end of May, and left open, the plants were not ready for transplanting before the beginning of October. If one considers the amount of extra work it entails to water and look after the seed-beds for an extra month and a half, he will see that the covering of the seed-beds with muslin is justified. This covering does not only ensure a quick growth by producing a higher

temperature, but at the same time protects the plants from pests, frost, and hail. Some naturally sheltered spots have been selected at certain farms, where beautiful tobacco plants were raised without being covered, but in these cases the seed has to be sown one month ahead, so that the plants may be ready in time for setting out. These conditions, however, are few and exceptional, and are not found on every farm.

### Preparation of Seed-Beds.

There are several methods of preparing tobacco seed-beds. For instance, hot seed-beds are prepared with a view to keeping a higher temperature in the soil, and it would be advisable for tobacco growers who live in high altitudes to follow this method, which is as follows:—Select a warm, sheltered spot if possible, with an easterly aspect, and with soil not liable to dry out (sandy loam is preferred). The ground should be trenched, and about four inches of fresh dung from the stable is placed in the trench and covered with about six inches of soil. In addition, the surface is thoroughly burnt, the ashes are then dug into the soil. Each yard of bed should receive one bushel basket of well-decomposed stable manure, which should be applied and mixed well with the surface soil. The surface is subsequently raked and smoothed, and the seed sown.

In the western part of the Cape Province, in low altitudes where this class of tobacco is grown, hotbeds are not necessary. The usual way of preparing a tobacco seed-bed which gives the best results is as follows:—A warm, sheltered, well-drained spot, consisting of a sandy loam, and preferably with an easterly aspect, is most desirable. Should the soil happen to be an old garden plot, it should be trenched about two feet deep, unless it has been newly trenched or kept scrupulously clean during the summer and autumn months. The bed is then marked three feet wide by any convenient length, separated by paths a foot in width. To every square yard of seed-bed, a bushel basket of well-decomposed stable manure should be applied, the manure being scattered broadcast and dug in about five inches deep. To prevent the seed-bed from being infested with weeds and insects, the soil should be burnt to a depth of four or five inches, using brushwood or other waste material. The ashes left should be mixed with the surface soil previous to sowing the seed. If this is not done properly, and the ashes are allowed to remain thick on some spots, the seed sown thereon will not germinate uniformly, and the seedlings will turn yellow and die. These conditions have been carefully watched by the writer, and in every instance it has been clearly proved that such was the case. One ounce of tobacco seed is considered sufficient to cover 100 square yards of seed-bed, provided the seeds have been graded on a machine and all are good. It is impossible to evenly sow such a small quantity of seed on such a large area unless it is mixed with something else. Fertilizer, wood ashes, or sand may be used for this purpose. Six teaspoonfuls of seed is equivalent to one ounce; therefore, for each teaspoonful of seed about one plate of carrier is used; the seed is thoroughly mixed and then sown on the seed-bed at the rate above stated. The seed is then covered with a thin layer of leaf-mould or finely sifted, well-rotted manure mixed with old grape husks. This covering should be applied by hand so as to ensure a uniform dressing. The seed should not be covered too thickly, as

they will not germinate; one-sixteenth of an inch is considered thick enough. Great care should be exercised with this particular work, as it has been clearly proved that wherever the covering was too thick the seed did not germinate. In some instances the seed germinated much later in the thickly covered spots than they did in the thin spots, and consequently the plants were not uniform.

### TREATMENT OF SEED-BEDS.

The surface of the seed-bed is kept moist until the seeds sprout, which may take from ten to twenty days after sowing, according to the weather. The beds are then watered daily with a watering can having a fine rose. The spray should be held low as to not wash the plants out of the ground. When the plants stand about half an inch high a little liquid manure may be applied to advantage. It is made by adding a handful of guano to about three gallons of water. Or finely sifted, well-rotted manure may be applied occasionally. Should sifted manure be applied, the bed should be watered at once so as to

*Plate No. LV.* Field of Turkish Tobacco, Cape Province.

prevent any damage to the foliage by the fertilizer. The rate of growth of the seedlings during the first month is very slow, but thereafter they grow at the rate of one to one and a half inches per week. A common fault is to sow the seed too thickly. If the plants are too thick on the bed it is imperative that they be thinned out when they attain a height of about an inch, otherwise the plants grow delicate and lanky, and a large percentage of them die when transplanted. The raising of good, healthy plants is one of the most important details in tobacco culture, and great care and attention should be given the work. The thinning out of the plants should not be done in the middle of the day, but either early in the morning or late in the afternoon. After the operation the beds should be watered well in order to re-establish the disturbed rootlets of the remaining plants. It is advisable after heavy rains to uncover and air the seed-beds during the day and cover them at night, particularly when earth fleas are present.

### PLANTING OUT.

When the plants attain a height of about three inches in the seed-beds, the muslin must be removed and the plants exposed to the sun;

watering must also cease at least ten days before planting out, so that the plants may be hardened and, therefore, be better able to stand the shock of transplanting (see Plate LIII). Before the actual process of removing the plants from the seed-bed for transplanting, the bed should be well watered so as to soften the soil and facilitate the pulling out. The plants are then drawn and placed in flat boxes or baskets, but not too tight, because if they are to remain in these receptacles for a day or so there is danger of them fermenting. The plants in the boxes, if kept in a cool place, can remain two or three days without water. It is also a mistake for plants which are left in the boxes to be watered every day. This will cause fermentation, and the plants will be unfit for transplanting. Great care should be exercised with the planting. The best time is when the weather is calm and bright. If the weather is cool, transplanting can be done during the

*Plate No. LVI.* Field of Turkish Tobacco, partly harvested.

whole day, but if the weather is hot transplanting should be done only late in the afternoon. Where soils are of a sandy texture transplant on rainy days, but on soils of clayish texture transplanting should be done after the rain; if done in the rain the soil hardens through being tramped, and great difficulty is experienced in loosening it later on; besides it considerably retards the growth of the plant. There is danger of the small plants flowering immediately the hot weather sets in. Before the plants are transplanted the land must be freshly ploughed, well harrowed, and the surface smoothed. Small, shallow furrows of about two inches in depth are then opened by means of a hand "Planet Junior" machine or with a spade. The usual distance between the rows is three feet, and the plants are put eight inches apart in the row. This method of planting has the advantage of permitting cultivation with a horse hoe, free circulation of air, and

also enables the production of straight stems, with a large number of leaves of small but equal size. The rows should run in the direction of the prevailing winds. A dibble with an iron point (see Plate LIV) is used for making the holes to insert the transplants. In case the soil is dry, it is advisable to wet it by leading water through furrows or by means of watering cans. This should be done a few minutes before transplanting. This forms a crust and prevents the soil from falling in the holes as they are made; the holes must be clear and at least six inches deep. The roots of the plants are placed in the hole and the soil packed firmly to them. Immediately after transplanting each plant is given a cupful of water. To prevent evaporation, it is advisable when the water is absorbed to cover the wet part with loose soil. After the first watering, given when transplanted, no further irrigation is necessary in localities having a dependable rainfall. Care must be taken that the tap root is planted straight, otherwise the plant will be slow to make growth. The time recommended for transplanting is from the middle of September to the middle of October, and, if possible, it should be completed within this period. If any of the transplants are destroyed by cut-worms and other insects they should be immediately replaced, otherwise the crop will be uneven, causing great inconvenience and involving extra labour for sorting and grading the leaf. Everything possible should be done to raise a uniform crop, as the expense and work afterwards is thereby considerably minimized and facilitated. It is impossible to conduct curing operations satisfactorily with irregular crops.

### TREATMENT DURING GROWTH.

Immediately after the plants have been established, which takes about eight days, hoeing by hand is absolutely necessary, and when the plants are about six inches high the horse hoe may be used to keep down weeds and maintain a surface mulch. It is advisable to do the cultivating when the soil is moist, so there will be no dust, as it seriously affects the quality of the tobacco. Cease cultivating as soon as priming commences, i.e. the removal of the lower sand leaves.

### TOPPING AND SUCKERING.

With Turkish tobacco no "topping" is necessary, and the flowers are on no account to be removed as is done with other varieties of tobacco (see Plate LV). If the flower heads are left undisturbed very little trouble will be caused by "suckers." When exceptionally late rains prevail, the plants after forming their heads sometimes produce suckers, and as these tend to weaken the vitality of the tobacco plant very materially, they should be nipped out when they are between two and three inches long. About eight to ten days after the first priming, according to the weather, the good leaves commence to ripen.

### SIGNS OF RIPENING.

(1) The lowest leaves, which were previously vivid green, turn a yellowish tinge. This is most noticeable at the tip of each leaf.

(2) Translucency in the place of the previous opacity when held up to the light.

These signs of maturity are most discernible before sunrise or in cloudy weather, as bright sunshine misleads the eye.

### GATHERING THE LEAF.

The leaf is gathered between daybreak and 9 a.m. The reason for gathering the leaf in the morning is not only to allow easy discrimination between the ripe and green, but because at this time the leaf breaks from the stem easily and causes no injury to the plant. The fine dew, which is hardly visible, is then on the leaf, and sufficient moisture is retained to enable the tobacco to colour better and sooner in the wilting-room. Tobacco picked during the heat takes longer to colour in the wilting-room and does not colour so well. Never, under any circumstances, gather tobacco after heavy dews until all signs of

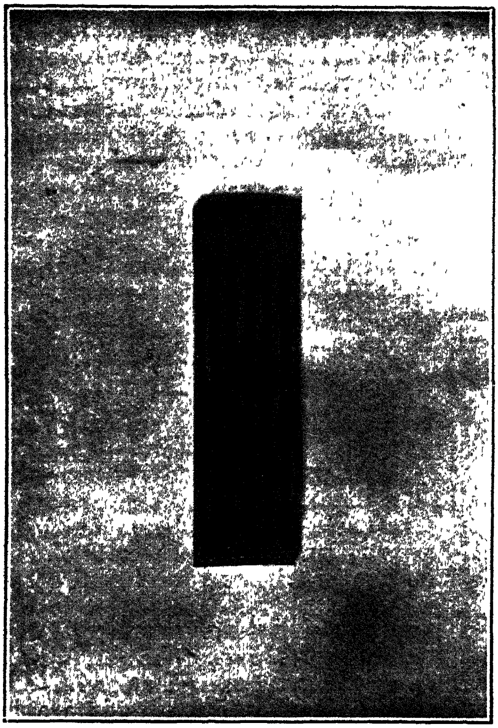


*Plate No. LVII.* Showing six needles used in threading the leaves.

moisture have disappeared, and after a rain an interval of at least twenty-four hours should be allowed before resuming picking, thus enabling the leaf to acquire oil and gum, which the rain washes off. If picked immediately after the rain the leaf is apt to turn mouldy. Unripe leaves always retain a greenish tinge, which is very objectionable. Over-ripe leaves lose colour, elasticity, and body. Usually one or more ripe leaves are plucked from each plant; seldom more than four at one picking. The leaves are gathered from the lowest leaf upwards in succession (see Plate LVI). These are placed evenly, one above the other, all facing the same way, in boxes or baskets, and when the baskets are full they are conveyed to a cool shed. Methodical handling at this stage facilitates subsequent treatment. The

remainder of the day must be occupied in grading and threading the leaves gathered during the morning hours. If they are left over fermentation is likely to set in. This happens occasionally owing to pressure of other work, when, as a result, the leaves ferment, turn mouldy, and have to be thrown away.

## GRADING AND THREADING THE LEAVES.

The grading and threading is done in a cool room, care being taken that there is no draught. The leaves must be kept as cool and

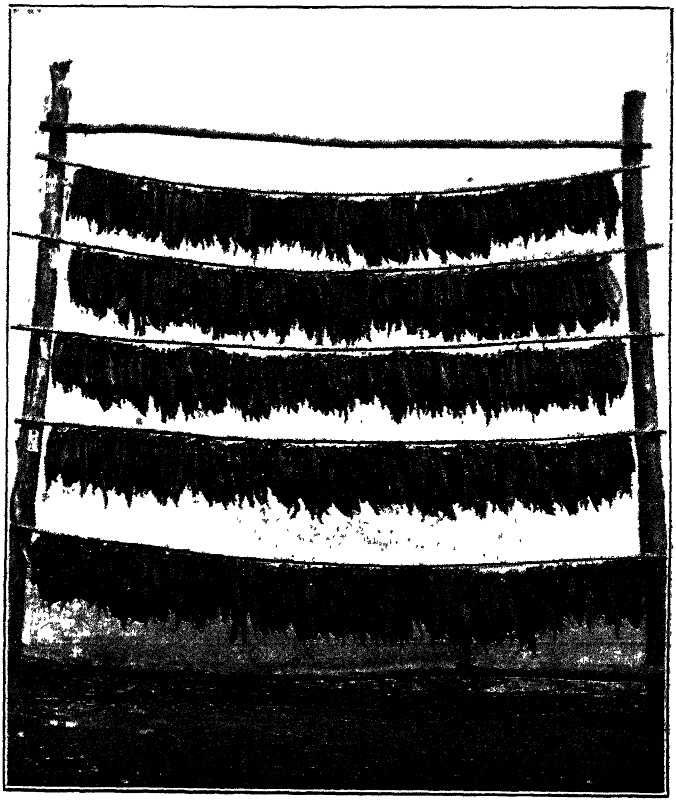


*Plate No. LVIII.*

Frame used for holding the reeds while the leaves are being threaded.

fresh as possible. All damaged and over-ripe leaves are put aside, and the remaining ones are graded according to their size and the rods on which they are strung are marked accordingly. If the leaves are properly sorted at this stage, and graded according to size, much time is saved at later stages and a more uniform colour is secured. It should be remembered that colour plays a very important rôle with tobacco, and the aim of the grower should be to produce a rich, golden, uniform colour, and not a dull one. These points cannot be emphasized too strongly. Ultimate success depends very

much on attention to these simple details. Past experiments show that those who neglect this matter were put to much labour and trouble at baling time.

The aim must be to keep the leaves as flat as possible, and if they vary in size the edges become folded and crinkled, and a ragged, shrivelled effect is the result. The assorted leaves are picked up one by one and threaded on the tobacco needles (see Plate LVII). The needle is put through the leaf about one-half inch from the base. The leaves are then passed on to a strong twine thread about eight feet long, care being taken to keep all the butts of the leaves at the same level. All leaves must face the same way and be packed together and strung to a seven-foot rod (five needles full are considered enough for a seven-foot rod). The string of leaves is fastened to the rod, which is then placed on a scaffold. Each end of the string of leaves is attached to the corresponding end of the rod, whilst securing bands

*Plate No. LIX.* Curing Camp for Turkish Tobacco.

to keep the thread drawn close to the rod are tied around at intervals of one foot (see Plate LVIII). Finally a label giving the date of packing and grading of the leaves is attached to each rod.

## FIRST STAGE IN CURING.

The rods with leaves are taken to the wilting-shed and hung about two inches apart on wooden rails. The aim is to let the leaves wither slowly and turn a yellow colour without moulding or decaying. Under ordinary circumstances this process will require from three to four days, depending on what stage the leaf is picked. If the leaves are picked on the ripe side they take less time; if, however, the leaves are picked on the green side they take a longer time to wilt. On no account should the tobacco be left more than four days, including the day of picking. If there is draught in the room the leaves dry and shrivel instead of becoming yellow and limp; the leaves also remain green and will not turn

yellow. In case the weather is exceptionally dry, and the tobacco shows no signs of colouring after two days, it is advisable to sprinkle the floor with water; this will increase the moisture in the wilting-room, and the leaves will turn yellow more quickly. The wilting-room may consist of any convenient shed or storeroom which is clean and cool. A building with a thatched roof is preferable; one which maintains a temperature, if possible, not higher than 70° F. Lofts and corrugated iron buildings should not be used for this purpose. The wilting-room is kept closed and dark from sunrise to sunset, and opened from sunset to sunrise so as to retain the moisture during the day and absorb fresh moisture during the night.

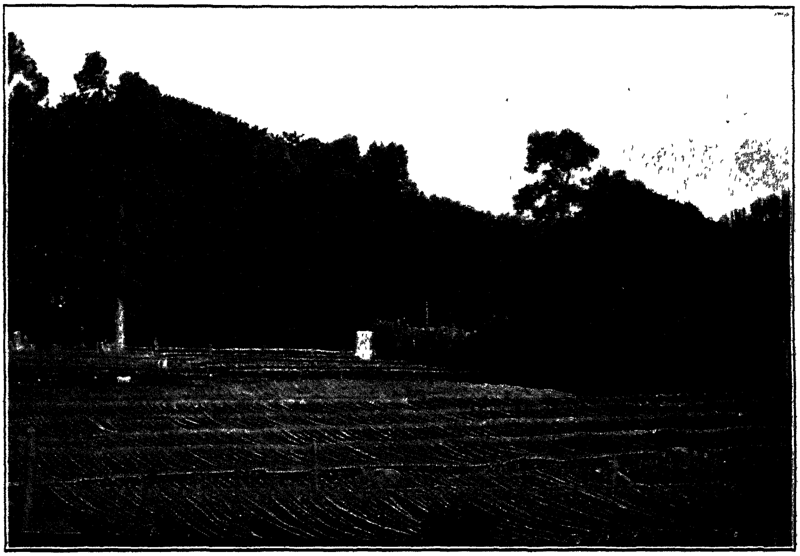


*Plate No. LX.*
Large Curing Camp, showing Windbreak to protect the Curing Tobacco.

## SECOND STAGE IN CURING.

When the desired colour is obtained the tobacco is transferred to the curing camp in the morning and placed on trellises (see Plate LVIX), the front of the leaves facing the prevailing winds. Great care should be taken to prevent the tobacco from being crowded by the rods slipping along the trellises; to prevent this, the end should be secured with strong twine. For the first day the rods are kept about two inches apart (see Plate LX), the tobacco being close together but not crowded, and in the event of a very hot day the tobacco should be covered with hessian sheets for the first day only. On the second day the rods are kept about four inches apart, and the third and subsequent days about six inches apart. The object of varying the widths is to expose the tobacco gradually and prevent sudden or too rapid drying, and to obtain a good colour. The leaves gradually change from a pale yellow to a light brown colour and become dry to the

touch. This process usually takes from fifteen to twenty days. depending on the weather. In the event of threatening rain all rods hanging outside must be immediately brought under cover and hung up singly, but not touching, and should be taken out again immediately the weather clears. The tobacco can remain on the trellises when the weather is threatening, provided it is covered with waterproof sheets. Sometimes the weather continues threatening for two or three days, then there is danger of the partially cured tobacco becoming mouldy. As a preventive, when the weather clears, the rods should be shaken and the leaves shifted from their position, thus allowing the air to come in between. Dew also affects the quality of the tobacco materially; protection should be afforded by covering the tobacco in the curing camp after sunset, and by removing the covering an hour after sunrise.

*Plate No. LXI.*
Curing Camp, showing Tobacco both on the scaffold and spread on the ground to dry.

## THIRD STAGE IN CURING.

When the midrib of the leaf is half dry the rods are removed from the trellises in the morning and laid on clean sacking spread on the ground (see Plate LXI). Each rod is laid singly and allowed to remain thus for the whole day, being covered with bagging during the succeeding night to keep out the dew. After removing the sacking the next morning the rods must be turned, exposing the other side of the leaves to the sun. This procedure is repeated daily until the midribs of the leaves are perfectly dry. The tobacco is then removed in the morning to the shed and stacked on platforms one foot high from the floor. In case the atmosphere is dry, and very little dew is experienced, the bagging should be removed very early in the morning to allow the tobacco to become pliable. Should there be no dew, the tobacco is

sprayed about sunrise with a very fine spray, and is then allowed about half an hour to absorb the moisture, after which it is brought in and stacked. After two days the tobacco is restacked, and every rod is carefully examined. If the tobacco is too damp the rods should be well shaken and hung in the sun in order to reduce the quantity of moisture.

Another way of softening tobacco when it is too dry is to hang the rods in the wilting-room near the green tobacco for a period of twelve to twenty-four hours, but care should be taken that the tobacco does not absorb too much moisture, otherwise it will ferment and turn mouldy in the stack.

A good way of testing for the correct amount of moisture in the tobacco is to take a handful of leaves and press them together for a couple of seconds; on relieving the pressure they should open like a sponge, but if they remain stuck together or do not open readily the tobacco is too damp and its moisture must be reduced. It sometimes happens that the leaves, having been picked a trifle green, or from some other cause, do not colour properly. In such cases they are dampened with water applied in a very fine mist with a spray pump. This is done when the tobacco is nearly dry. One day one side is sprayed, the next day the other. This is repeated only once on each side of the leaf. Spraying is not necessary if the proper colour is acquired without it.

Tobacco transferred from the wilting-room into the curing camp, or vice versa, should not be carried by hand, as the leaves are apt to be bruised and become black. They should be carried by means of a hand frame (see Plate LXII).

### PREPARATION FOR BALING.

The cured tobacco is brought into a cool, clean, dry room and stacked on platforms raised about one foot from the floor, even if it is a wooden floor. The tobacco is well covered with sheets of hessian to retain its moisture and to improve its condition, as well as to keep out the dust. In this state the tobacco may be kept until a convenient time for baling. It should be examined occasionally to see that there is not an excess of moisture to cause fermentation. Should the tobacco begin to ferment the leaves must be well shaken and hung out to cool and then be restacked; in fact, the stacks should be broken down at least once a fortnight and restacked. This operation will bleach and considerably improve the colour of the tobacco.

### BALING.

Before baling, in case the tobacco is very dry, the rods are laid down flat on clean sheets of hessian and sprayed gently on one side only with water. The tobacco is then stacked, always keeping the damp part upwards so as to bring the moisture in contact with the unsprayed part. By this means the whole mass becomes soft and elastic. Two days after the tobacco has thus been sprayed it should be restacked, and in so doing care should be taken, for if any part feels too damp it should be taken out, shaken well, and hung in the sun to reduce its moisture. After this operation it is advisable to allow the tobacco to remain in the stack at least one week before it is baled, so that it will absorb the moisture thoroughly. The leaf then becomes soft and plaint, but if too much water is used fermentation will set

in and the leaf becomes mouldy. It will thus be seen that great care must be taken in carrying out this simple but important process. Before the tobacco is baled it should be graded, and each grade endorsed on the bales accordingly. Plate No. LXIII shows the press in use for baling Turkish tobacco. Baling may be undertaken at any convenient time after the conclusion of the drying process. The operation is best carried on in fine weather, in a cool shed, provided the tobacco is supple and elastic in the stack. If the tobacco is dry it is best to bale it during wet weather. Care should be taken not to allow the tobacco to absorb too much moisture. The strings of leaves are cut from the supporting rods at each end and folded in such a way as to correspond to the size of the baling press. The butts are turned

*Plate No LXII.* Hand Frame for Shifting Turkish Tobacco.

outwards and the tips towards the centre. When the press is full the lid is put on and pressure applied for a few minutes, after which the box is refilled; this process is repeated till the bale is complete. It is a great mistake to apply too much pressure, as the gummy leaves stick together and cause great inconvenience to the warehouse operators, and black stripes appear on the leaves on account of the oil being squeezed out of them. Ultimately the bale is removed from the press and sewn up in canvas, with the ends of the bale showing the butts of the leaves left open. The canvas does not cover these ends, but is laced together criss-cross like a widely laced boot. The usual weight of a bale is 80 lb. It is then properly marked and sent to the warehouse, where it receives further treatment and is allowed to pass through the stage of ageing.

## ACCESSORIES REQUIRED PER ACRE.

1. A supply of butter muslin for covering seed-beds.
2. Six tobacco needles for threading the leaves.
3. Six baskets or boxes for gathering the leaves.
4. One knapsack spray pump with a vermoral nozzle.
5. 500 Rods or reeds, seven feet long, for supporting the strings of leaves.
6. 500 Labels, two inches long.
7. A supply of hessian, bags, or other material for protecting the tobacco from dew and rain.

## PESTS AND REMEDIES.

There are numerous pests which attack the tobacco plant, but the most troublesome ones at present in this part of the Cape Province are earth fleas, slugs, cut-worms, and bud-worms. The two former pests generally attack the plants in the seed-beds, and the latter attack them in the field, and if left to themselves they are capable of destroying entire crops. It is, therefore, the duty of every grower to combat these pests.

From observations made at the several farms where they grew tobacco I found that where a crop had been attacked by pests the land had been allowed to remain weedy during the autumn and winter months, but where the land had been kept clean or happened to be new very little trouble was experienced.

There are many remedies for these pests which can be recommended, but the best remedy is to destroy the pests in a natural way, viz., by preventing the lands from becoming weedy and thus starving them, or by choosing entirely new soil. . New soils situated far away from any gardens are recommended for seed-beds, but wherever this is impracticable the best way to treat the plot of ground where seed-beds have previously been made would be to keep the surface, as well as the surroundings, clean during the summer and autumn months.

### *Earth-Fleas.*

According to a description given in Bulletin No. 19, reprinted from the *Cape Agricultural Journal* of May, 1908, by Mr. R. W. Jack, assistant to Entomologist, earth-fleas are a species of mite which thrive in damp, sheltered places, and causes great destruction to vegetation. Clean cultivation is absolutely essential to keep them in check. Seed-beds are sometimes completely destroyed by earth-fleas; this generally happens in old, damp, sandy gardens, especially during rainy seasons, and particularly when the seed-beds are covered with muslin. The muslin over the seed-beds certainly has its advantages, provided the grower knows his business. The seed-beds may remain covered as long as fine weather prevails, as this causes the plants to grow faster. They should be opened during the day after every rain, exposing the plants to the sun so as to reduce the moisture and thus make conditions less favourable for these mites to thrive.

To prevent the earth-flea Mr. Jack recommends tobacco extract, using one part (fluid) to sixty of water. Application can be made by means of either a knapsack or bucket spray pump fitted with a Bordeaux nozzle. Spraying should be repeated after eight days, as the mites become plentiful again,

There are numerous other insects which also cause great damage to the young tobacco plants by eating the leaves. To destroy them, use one pound of arsenate of lead to twelve gallons of water. This solution can also be applied with either a knapsack or bucket spray pump, but preferably with a "vermoral nozzle." The treatment should be repeated after eight days. It is also advisable to thoroughly spray the seed-beds a day or two before transplanting; this to be done as a preventive against pests attacking the young plants in the field.

The above-mentioned solutions have been applied at several farms

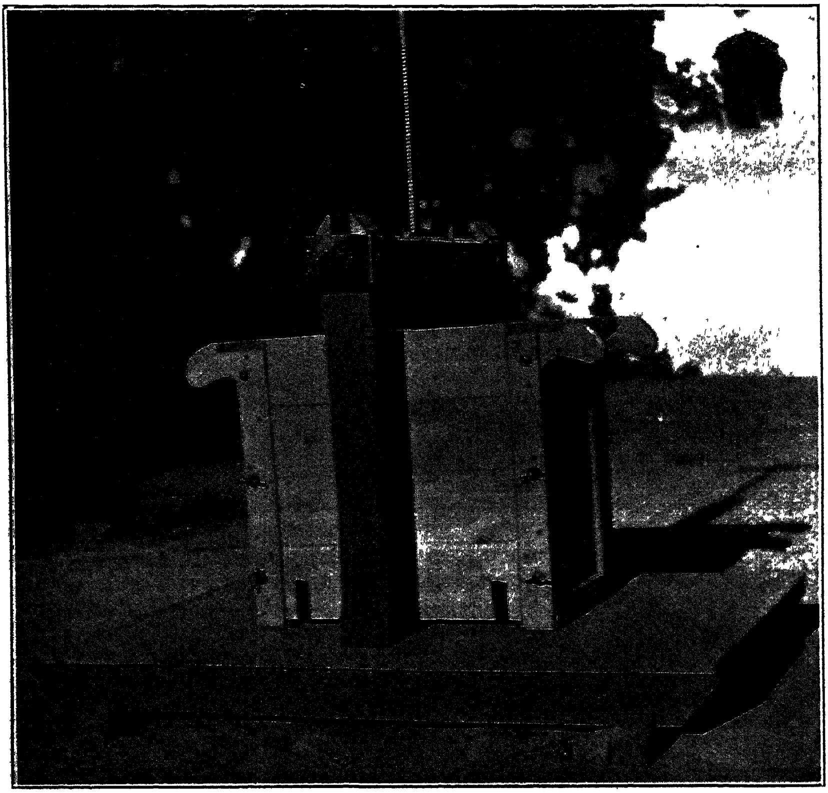


*Plate No. LXIII.* Baling Press used for baling Turkish Tobacco.

where experiments with Turkish tobacco were conducted, and they proved not only successful, but were instrumental in saving many a seed-bed and field from destruction.

*Cut-Worms.*

Where cut-worms are known to be bad in the lands it is advisable to treat them to poisoned bait before beginning the transplanting, as recommended by Mr. C. W. Mally, Government Entomologist, in Bulletin No. 50, reprinted from the *Cape Agricultural Journal* of November, 1908. The preparation is made with one pound arsenite of soda, eight pounds of treacle or brown sugar, and ten gallons of water.

These portions are mixed in a tub and filled with green vegetation, such as lucerne, green barley, green oats, or cabbage leaves, to become thoroughly soaked with the mixture. It is then applied after sunset broadcast on the land. This treatment should be done a week or two before setting out the plants, and should be repeated after four days. The bait is sown in the evening so it will keep fresh over night, as the cut-worms crawl about at night in search of food, and readily eat the bait. Applying bait on weedy lands is absolutely useless. Before applying the bait the land should be ploughed and any vegetation left on the surface destroyed by harrowing.

*Bud-Worms (Heliothis armigera).*

These worms generally attack the small leaves of the plants in the field, and if left undisturbed are capable of destroying entire crops. As a remedy, the plants must be sprayed with a solution of arsenate of lead in the same proportions as recommended for the seed-beds. After the plants attain a height of about one foot this treatment should cease, as the arsenate of lead sticks to the leaf and tends to cause deterioration in the quality of the tobacco. After this stage the bud-worms should be picked by hand. If the moth, which generally appears in the field from the middle of November till the end of December, could be caught and destroyed, very little trouble would be experienced with bud-worms. Fortunately, these worms are very fond of the tobacco seed, and as the Turkish tobacco flower head is not "topped," as is customary with other varieties of tobacco, the bud-worm feeds on and confines itself to the seed; but sometimes it makes its appearance before the flower head is formed, hence the advisability of either spraying or hand-picking to kill them.

*Mildew.*

This is a species of fungus generally found in badly drained soils and in sheltered spots, or caused by atmospheric conditions. Fortunately in the Western Province, though having had some experience with this fungus, we have been able to avoid it by establishing our tobacco plantations on well drained soils, and by allowing free circulation of air between the rows; also by priming the leaf at the proper time, thereby providing a further free circulation of air beneath the plants.

*Mosaic Disease.*

This is so called on account of a mosaic-like appearance of the leaf. This disease appears on the leaf in dark green spots, and sometimes the whole of the plant is affected. Such a leaf is absolutely worthless after it is cured. The dark green spots never change to a desirable colour, and never contract moisture, and are, therefore, brittle to the touch. So far, no remedy has yet been discovered, but it is surmised that the disease is caused either through an excess or deficiency of minerals or moisture in the soil, or through injury to the roots when transplanted; fortunately, this disease has so far caused very little trouble. When a diseased plant is found it should be destroyed.

# Irrigation in South Africa.*

By A. S. Carbarns, Box 84, Witbank, Transvaal.

In starting a scheme of irrigation, whether on a large or small scale, the first thing to be considered is the supply of water available, and the two main points to be decided in this respect will be whether the water is in a suitable position for leading on to the land it is desired to irrigate, and whether the supply will be adequate for what is required of it.

In a hilly district—such as in many parts of Natal, for instance—there are generally a good number of streams or spruits, and if these are what is termed never-failing or having a fair flow of water in them all the year round, they are perhaps the best and most economical means of irrigation, at least for the man of small means.

In such places as the high veld of the Transvaal, where rivers or streams are few and far between, the only visible supply of water on many farms being contained in small pans—or "kuils" as they are called locally—then the problem of irrigation becomes far more difficult to solve. In such a case the water for irrigation would have to be conveyed long distances through pipes or channels (provided, of course, the lay of the land permitted), or raised from underground by means of boreholes or wells put down, with pumping plants worked by steam or other motive power, and in either case the cost might scarcely be warranted.

Again, dams might be constructed in any natural basins commanding land suitable for irrigation, and allowed to be filled by the rains in the wet season. This plan would be more or less uncertain, as, unless the catchment area was very large, it is questionable if enough water could be obtained in an ordinary season to make the proposition a payable one. Still, there is no doubt a lot of benefit would be derived from such dams if they were so situated that the ordinary summer crops could be irrigated in times of drought.

Still another plan of obtaining the necessary water is adopted in some places, namely, that of erecting pumps driven by steam or oil engines on the banks of rivers. This plan is also a costly one and would only be entertained where there was a practically unlimited supply of water and a large extent of good land to use it on.

It is not the intention of the present writer to deal with either of the last-mentioned methods of obtaining water for irrigation purposes, but merely to attempt to explain the method of irrigation of which he has had actual experience, namely, that of leading the water from a stream on to the land. This method will probably be the one best suited to the needs of the small man, while the more costly schemes can safely be left to the man of money or to the Government.

The farmer, then, who is farming a piece of land with one or more streams running through it will, if he contemplates putting any of the land under irrigation, want in the first place to satisfy himself

* Awarded prize by South African Irrigation Association.—Actg. Ed., A.J.

as to whether he is able to get the water to the desired field or fields. In some cases he may be able to decide this point by his eye alone, unaided by levelling instruments of any kind. However, it very often happens that a field which looks to the eye much above a given point is, when the levels are taken, found to be below it. It may, therefore, be taken for granted that in most cases a level of some kind or other will be necessary to give a fair idea of the lay of the land and for the work of laying out the furrow. Nowadays there are levels for the purpose in the market, comparatively cheap and accurate, but it is not every man who may care to go in for one of these.

The levels can be ascertained fairly correctly with the aid of a gun barrel and an ordinary spirit level with a box of some kind to place them on and act as a stand. Another box of the same height will be required to place at the point to which it is proposed to sight. Two seed potato boxes or two paraffin tins will answer the purpose quite well, provided they are of exactly the same height. A substitute for the second box or tin may be provided in the shape of a light pole with a conspicuous mark on it, but this mark must be exactly the same height from the ground as the top of the box which is used for a stand.

Having got these homely implements together the farmer can now proceed to find whether his field is sufficiently below the level of the point where he has decided to take out the water to ensure enough fall to bring it there. The amount of fall required is very little. One inch in twenty yards is generally considered sufficient, though a little more than this will do no harm, provided the water can be efficiently controlled when it reached the field.

To begin operations with his home-made levelling apparatus, the operator should first of all place a flag at the highest point of the field; then, going to the proposed dam site, place his stand in position just where the water will enter the furrow, lay his gun barrel on it pointing to the flag and the spirit level on top of the gun, raising or lowering the point as required till it is in a perfectly level position as shown by the spirit level. Having fixed it in this positoin by means of pads of paper, bits of wood, or anything he may find handy—it does not much matter so long as it keeps the gun level—he can then glance along the barrel and see where the foresight strikes on the flag. This will give him a fairly accurate idea of how far he is above the field. Of course, if he is below it his sight will strike the ground somewhere between his position and that of the flag. It may happen that there is a bit of rising ground between the dam site and the field in a straight line, which prevents the sight being taken this way. In that case the levels should be taken from an intermediate point to one side or the other of the obstacle. A flag or mark should be placed at the proposed dam site as well as in the field, and from the intermediate point selected the sights should be taken, first sighting to the dam site and then to the flag in the field. If he finds he is slightly below the spot where he intends taking out the water and still above the highest point in the field, it is obvious that his scheme is practicable as far as fall is concerned.

If the first sightings have shown that there is a nice fall in a straight line then the rest is all plain sailing, but it is not often that this is so. It more often happens that there are a number of heights and hollows to be negotiated in a straight line which it will pay better

to go round than go through. The latter course would entail more or less cutting on the one hand and banking on the other; and while cuttings are to be preferred to embankments, for the reason that when finished there is not much chance of the water escaping from a cutting, except in the way it should go, whereas it has a nasty way of finding a way out through an embankment somewhere or other, it is as well to avoid both if possible.

If, then, it is decided to dodge these rises and falls in the ground, the levels will have to be taken again for the purpose of laying out the furrow. In this case the stand is again placed at the proposed water outlet and the gun barrel adjusted as before to the level, pointing this time to a point which will enable the furrow to get round the first obstacle or as high up in the case of a depression in the ground as the line of level will permit, and vice versa in the case of a rise, so as to ensure a minimum of either banking or cutting and still retain enough fall. The second box is now brought into service, being placed at the point to which it is desired to sight and an assistant should be at hand to move it about according to the signals of the man at the gun until it stands slightly below the level of his position. A peg is then put in on the spot where the second box has stood and the box removed to a point further along the line and enabling it (the line of furrow) to go round the next obstacle and so on until all of these have been rounded or as nearly avoided as may be, and as soon as a straight run can be had for home the better.

Having now marked out the course for the furrow, the actual work of making it can be proceeded with, or it can be left until the dam wall is built. However, a word here as regards taking out the furrow may not be out of place. Of course, where the nature of the ground permits the plough will be used to make a beginning, while the stones and rocks will be shifted with the pick and shovel or other implements of sheer force and skill, or stupidity, as the case may be.

Assuming that the furrow will have to round a number of obstacles the line, as marked by the pegs or flags which have been put in, will present a rather zig-zag appearance—something similar to the Natal railway in places—but, however curved it may be, along this line the ploughman will have to guide his plough or as near it as he possibly can. One thing to be observed in taking out a furrow is to avoid abrupt turns. Let all the curves be nicely rounded so as to present as little resistance to the water as possible, particularly should this be borne in mind if there is not much fall.

A good way of ploughing out a furrow is to start from one end of the line throwing the sod to the lower side and returning throwing the other furrow to the opposite, leaving a strip in between untouched just broad enough for the plough to take in a third journey. This centre sward is then thrown to the same side as the first—the lower one. This will make the bottom of the furrow wide enough for the plough to go along again and make it 6 inches or so deeper. All the sods and loose earth must now be cleared out of the furrow and thrown to the lower side, and the plough may again be requisitioned to loosen another layer of the soil in the bottom, if necessary.

It is possible that even after going round the larger obstacles there may be still some minor inequalities in the water-course which will entail some little digging out or banking up. There is only one way of doing the former, and when finished, as I have already said,

the water will seldom escape from it except to follow the proper course, but with banking it is different. The native has a great idea of the power of stones to stop water, and if not watched will shove them in all parts of the embankment. It is scarcely necessary to say that these should never be used in the work, except as a buttress or support behind the earth or sods, certainly not in the centre or face of the bank, unless of course they are masoned in.

After the furrow has been taken out the next thing to be tackled is the damming of the stream, and here there is considerable choice of both methods and material to be used.

The best and most lasting weir is undoubtedly one composed of good concrete or of solid masonry, but here again the beginner in irrigation may not care to incur the expense entailed in the construction of either of these, strong and lasting as they may be. He may very likely prefer to put up one less expensive—and, of course, of less strength and lasting qualities—for at least the first year, till he sees how his scheme is going to pan out. Discarding then the weir of concrete or masonry, there is still some choice left; it may be made of earth alone, and if it is possible to run the carts over it in the process and tread it well in with cattle a fairly water-tight structure can be made in this way. Another way is to build two rough walls of stone, if such is to be had close by, filling in between with earth rammed tightly down. Another way, and one that answers the purpose as well as any and entails less labour and expense, is to build one rough stone wall, stretching a covering of old sacking along the face or front, fixing the edges firmly into the building as it is proceeded with and leaving the loose ends hanging over the face so as to cover it from top to bottom and from end to end. Then the earth is rammed or tramped tightly in. This makes a very serviceable weir, the sacks if properly placed preventing the earth from silting through the stones, and with a little attention now and again will last a long time.

One essential point in beginning to build a weir is to see that it rests on a good foundation. All loose stones and boulders should be removed, and some that are not loose would be better out, even it takes a little blasting to do it. In short, get to the bedrock or other firm bottom if you possibly can before putting in a spadeful of earth or one stone on top of another. There is generally more leakage from under a weir than through it.

Another important point to be attended to is the direction the wall will take. It is not a good plan to build it straight across stream, but rather to build it in a diagonal line across. This is to say, have the end opposite the water outlet a few feet up-stream. This allows the water to enter the furrow more naturally and smoothly with consequently less pressure on the wall and less friction at the entrance to the furrow than if built straight across.

Having now finished the furrow and the dam, we can proceed to lay out the field which is to be irrigated. This is best done when preparing the land for seed. If the field is level, or nearly so, with a slight fall from one side or end to the other, it should be laid out in ridges 12 to 15 yards broad, running in the direction of the fall, and the best way to go about this work is as follows:—Assuming that the ridges are to be 12 yards wide, the first fuorrow—or rather, to make it plain, the initial furrow of the first ridge—is drawn 6 yards from the fence or boundary line of the field, and the next 12 yards from this

and so on until the other side of the field is reached, keeping all the furrows 12 yards apart. Then when the actual ploughing is commenced a start is made on the furrow first drawn—that which is 6 yards from the fence—and this ridge ploughed, turning always to the right at the ends. By the time the plough has reached the fence or boundary line on one side it should have reached halfway to the next furrow on the other side, thus the first ridge of 12 yards wide is finished. The next ridge and all the rest are proceeded with in the same way, always turning to the right at the ends and never to the left. Turning in this way is what is, in Scotch farming parlance, termed "gathering," as you are thereby gathering all the furrows together, so to speak. If the method of "gathering" is adhered to throughout the field the ridges will be of a uniform width and have a nice slope on either side, but if the ploughmen have been allowed to turn to the left when nearing the finishing-up point of a ridge then the ridges will be all sizes, broader on one side than the other, and the slope more to one side of the ridges. If the field has been well ridged up in this way, when the seed is sown and the ground nicely harrowed, the crowns of the ridges will still be visible, and along these crowns shallow furrows should be drawn with the plough, a double mould-board one for preference. These shallow furrows are termed feeders and the water is allowed to enter the small feeders. It will depend on the quantity of water at command how many feeders are filled at a time. If there is abundance of water a number will be filled and the same number of ridges irrigated at the same time. If, on the other hand, the water is scarce, not so many will be filled and less ground irrigated at once. It is here where one has control of water, and he must exercise that control so that the water will neither wash out ruts by having too much in the feeders nor go too slowly by having too little.

In beginning the actual work of irrigating it is not advisable to start at the top of the field right away, but having let the water into as many feeders as are judged to be sufficient for the water there is, let it flow down the feeders till it reaches nearly to the bottom of the field before putting in any stops. When it has got to the required spot near the bottom of the field, stops can be put in and the water dammed back so that it will overflow the feeders; and it is now the duty of the man in charge to see that it does not run in little streams so as to cause ruts, and to guide it so that it spreads evenly over the ground on both sides of the ridge. If a roller has been run over the ground the work will be much easier and better done and less water will be wasted. As to stops, an old sack may be used, but it is more usual to use a spadeful of earth, the water running out of the cut that has been made by the removal thereof.

By beginning at the lower end of the field and working back towards the top it will be found that a good portion of each ridge whose feeder has water in it will have been self-irrigated through seepage. If, on the other hand, the work is started at the top right away, that end may get rather more water than is necessary. It often happens that in a comparatively level field there may be a slight depression in some part of it where the water is apt to stand. The furrows or feeders should stop short when they reach this and begin again on the other side, the water being led round and such depressions avoided altogether and no water given them. They will draw

enough water from the higher ground without its being run on to them. As I have just said, the water is apt to stand in such depressions, and, as nothing injures a crop more than standing water, they are best left without it altogether, trusting to the seepage to supply the want.

The system of laying out a field for irrigation just described applies to one that is practically level, but where there is much of a slope it is better to adopt what is termed the "catchwater" system, and in this case the furrows or feeders will be drawn across the slope instead of with it. The water is led into the top feeder and allowed to run the whole length of the field and made to overflow on the lower side, being caught by the next furrow when the intervening space has been irrigated. Care is necessary here to prevent it from washing, as it is very apt to do if there is a large volume of water. Both systems require constant attention by day, and if the water is left on overnight to look after itself it should be spread over as much ground as possible so that it will have no chance of washing.

These remarks apply mainly to arable lands, but grass lands will require much less attention, not being so liable to washing, or erosion as it is technically termed.

Now as to the frequency or number of times a given field or crop should be irrigated, this point can be best left to the man on the spot. It would be presuming too far for any one to lay down a hard and fast rule in this respect. So much depends on the nature of the soil and variety of the crop to be irrigated that advice is not of much use, and the man on the spot will know what to do in the matter better than any one else. Generally speaking, however, it may be pointed out that a loose or porous soil will require more water than a stiff tenacious one. Indeed, great care needs to be exercised in irrigating the latter, as it very easy to give it an overdose. Irrigation is a splendid thing in moderation, but if overdone on certain soils it is as bad as a drought. A drought will probably leave you something to reap, but a water-logged field will yield nothing. A nice deep loamy soil is, I think, about the ideal soil for irrigation. Such a soil can do with a good supply of water and make more use of it for the benefit of the crops it is growing than either of the last-mentioned soils. When the surplus water given to a loamy soil has found its way down to the pan or water level the capillary attraction possessed by such a soil will bring it within the reach of the plant roots when required.

Again, much will depend on the time of year the irrigation is practised as to what amount of water is given. If in the summer, or what is termed the wet season in South Africa, the supply will be regulated by the rainfall or the want of it. If, on the other hand, the crop is sown in the autumn and grown through the winter, then the irrigation will be a more regular matter. The days at this season being short and the sun's warmth less, it follows that the evaporation is nothing like so great as in the summer, therefore much less water will be required for a given crop than would be necessary in a spell of drought in the latter season. Another reason why less water is required in the winter is the fact that there is but very little growth then, all plant life being practically dormant, and if the crops keep green and healthy during the cold months of the year this is about all we can expect of them, and it is a comparatively small amount of water that is required for this. It is towards the spring when the

young plants are beginning to shoot and at the time they are coming into seed, if a grain crop, that they require a liberal supply of water. However, after all is said and done, I think the best advice that can be given is this: Give your crop a drink, as you would give your horse, when it wants it, but do not give it too much; and I believe the man running the show should be best able to judge as to what time to water and how much to give.

### DRAINAGE.

Although this is the exact opposite of irrigation, still it is most important to be considered. Of course, no one would think of going in for a complete system of underground drainage and one of irrigation on the top of it. This would be taking away with one hand what you were giving with the other. At the same time a fair amount of drainage—not necessarily underground—is required in irrigation, as water to be of use to the plant must be in circulation and not stagnant, and unless there is enough drainage to draw off the superfluous water proper circulation is impossible. Therefore, it is well in selecting a bit of land for irrigation purposes to choose that which has good natural drainage. If the water is at all likely to stand drains should be made to draw it off.

# The Testing of Ostrich Eggs.

By J. C. SMITH, Grootfontein School of Agriculture.

THE testing of ostrich eggs is a matter of great importance to every ostrich farmer, and it is only after some experience that one is able to tell with any degree of certainty whether an egg be fresh, unfertile, whether it has germinated, the degree of development of the embryo within the egg, or whether the egg be addled.

*Method of Testing.*—The operator should envelop his head and shoulders in a dark cloth (an ordinary dark coat lined serves the purpose very well), leaving only a small opening before his face in which the egg is held (see plate LXIV). He then holds the egg up towards the sun so that he would present the appearance of looking through the egg at the sun. Care should be taken that the cloth or coat is held very tightly round the sides of the egg so that no light can be admitted to the dark chamber thus formed.

*Appearance of the Egg.*—*A fresh egg* presents a yellowish orange appearance, and the yolk may distinctly be seen as a darkish mass floating in the white. In a freshly laid egg the air-space is only

very small. *An unfertile egg* presents exactly a similar appearance and cannot be detected until incubation has commenced (see plate).

*On the fourth day* after incubation has been commenced, the germ in a fresh egg may just be detected. It appears as a tiny black speck in the yolk. It is not safe yet to discard any eggs as unfertile (see plate).

*On the seventh day* the germ or embryo will be noticed to have grown a little and has a shadowy ring around it. The air-space will

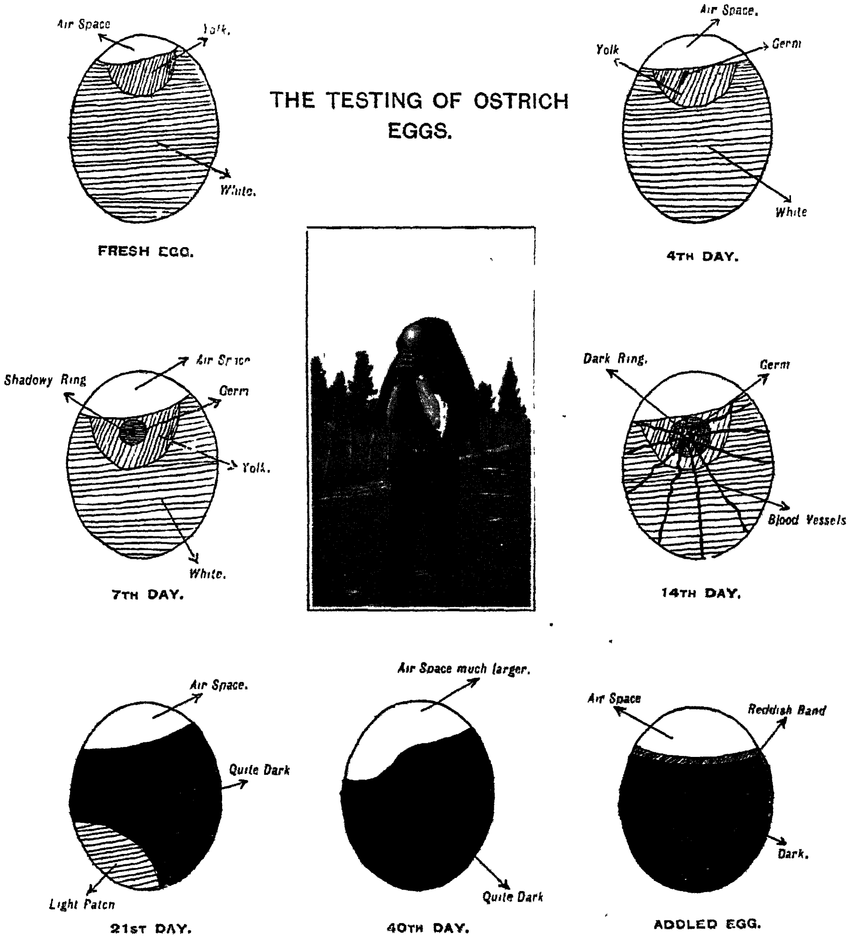



*Plate No. LXIV.*

be noticed to have grown a good deal large (see plate). It is fairly easy now to detect the unfertile eggs, but any about which the operator should be doubtful should still be retained.

*On the fourteenth day* the embryo will be seen to have grown considerably larger and the shadowy ring a good deal darker, whilst broad blood-vessels may be seen running around the egg in all directions. These present the appearance of wide black lines about the egg (see plate). All unfertile eggs may now be discarded.

*On the twenty-first day* the egg appears all dark, with the exception of the air-space (which has now grown considerably larger) at the top and a patch nearly the same size at the bottom of the egg (see plate).

Between now and the thirty-eighth day this light patch at the bottom gradually disappears, and *on the thirty-eighth day* the whole egg should appear dark, with the exception of the air-space at the top. Respiration of the chick may now be also seen, and it is sometimes felt to kick inside the shell.

*About the fortieth day* the air-space becomes suddenly much enlarged, and then after about twenty-four hours disappears altogether. Twelve hours after this the chick should break the shell.

*An addled egg* is sometimes mistaken for a good egg which has been incubated for a period of about five weeks, but may be detected by the broad reddish line which will be seen to encircle the egg just below the air-space (see plate), and by the fact that its appearance does not change with the development of the other eggs.

It sometimes happens that an egg germinates and the embryo dies after a few days. This may be detected by noticing that there has been little or no development since the last testing, and after a time, if the appearance still remains the same, it may be discarded.

All eggs which are discarded should be broken carefully so as not to disturb the contents and the stage of development compared with the appearance when testing. This teaches one far more than any amount of reading on the subject will do.

When put into the incubator all the eggs should be marked with distinguishing numbers, the date when put into the incubator, and the numbers of the parent birds.

The accompanying table will give an idea of how the development of the eggs should be recorded.

APPEARANCE WHEN TESTED.

| No. of Egg. | Parents' No. | Date placed in Incubator. | 5/7/13. | 8/7/13. | 15/7/13. | 22/7/13. | 29/7/13. | 5/8/13. | 10/8/13. | 11/8/13. | 12/8/13. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Cock 15, Hen 26 | 1/7/13 | Good | Good | Good | Good | Good | Good | Good | Good | Hatched. |
| 2 | " " | " | ? | ? | " | " | " | " | " | " | " |
| 3 | " " | " | Good | Good | ? | Germ | inated | but | died. | — | — |
| 4 | " " | " | " | " | Good | Good | Good | Good | Good | Good | Hatched. |
| 5 | " " | " | ? | ? | Unfer | tile. | — | — | — | — | — |
| 6 | Cock 25, Hen 11 | " | Good | Good | Good | ? | ? | Germ | inated | and | died. |
| 7 | " " | " | ? | ? | ? | Unfer | tile. | — | — | — | — |
| 8 | " " | " | Good | Good | Good | Good | Good | Good | Good | Good | Hatched. |
| 9 | " " | " | " | " | " | " | " | " | " | " | " |
| 10 | " " | " | ? | ? | ? | Unfer | tile. | — | — | — | — |
| 11 | " " | " | Good | Good | ? | Good | Good | Good | Brok | en. | -- |
| 12 | Veld Egg ... | " | ? | ? | Bad | — | — | — | — | — | — |
| 13 | " ... | " | ? | Unfer | tile. | — | — | — | — | — | — |

*N.B.*—A fresh page should be started for each batch of eggs placed in the incubator.

# Sheep Breeding.

By A. M. Spies, Sheep and Wool Expert for the Western Transvaal.

(*Lecture delivered to Short Course Students at School of Agriculture, Potchefstroom.*)

In the past sheep breeding has been looked upon by many farmers as a side line and a branch of secondary importance.

You will agree with me that there is a great future for the wool industry and sheep breeding in South Africa. It lies within our power to develop that industry and to become successful breeders by paying careful attention to our sheep breeding.

*Choice of Types.*—It is difficult to advise farmers as to choice, and it is far better for a farmer individually to make his own choice. I would advise choice of types as follows:—From experience the Wanganella type thrives better in a dry country with uncertain rainfall; the Tasmanian type requires good grass veld with a regular dependable rainfall. After having decided on the type, the first most important factor is to select animals of good sound constitution, which means a good, well-built, symmetrical frame. I may mention here that it is impossible to make sheep breeding a success unless you build on sires having a good, strong constitution. Always select your sires with good constitutions and on the strong wool side. My reasons for recommending strong wool sires are:—Because the tendency in this country is to fine wool, and unless breeders are careful to guard against and not to encourage fine wool too much they will breed sheep with bad, weak backs that would not keep dust and dirt out of the fleece.

In our dry climate fine wool is inclined to be soft and flimsy, with no body or weight. In order to get a good, sound fleece always keep to the strong and medium wool—with fine and flimsy wool the fleece generally gets divided and open on the back.

*True Type Selected.*—I must draw your attention here to the advisability of sticking to the true type, and not to introduce sires of different types amongst your flocks. If you change your sires from one type to another you will never be able to get a uniform clip, and the progeny will always throw back. It depends largely on the class of ram used in the flock. An irregular staple of wool does not command the same price and does not appeal to the wool buyers. Let the rams be as near the ideal sheep as your pocket will allow; it will be money well spent, but to make any great improvement, even with the best rams, the young sheep must be classed every year before going to the ram.

*Character and Quality.*—Character and quality I consider the most essential points in sheep breeding. A ram without quality and character is useless as a sire. The result from using him would be failures every time, even if he should be perfect in all other points. The wool of a sire must be bold and strong, showing a good crimp and soft to handle. Quality, length, and brightness are points every sheep breeder should aim for.

*Density.*—Every animal should have wool as densely packed as possible without diminishing the length to too great an extent. The correct method of testing density is to open the wool and observe the space of skin visible—the less skin the denser the wool. A pink skin is preferable. In casual observance you sometimes find a long stapled sheep appear loose, and many a loose fleece with a sticky yolk and a dirty tip appears extremely dense. Therefore testing is always the best guide.

*Classing the Flock.*—A farmer should cull before putting the young ewes with the ram. Several sheep breeders are accustomed to cull only the breeding ewes when they are of visible age or broken mouthed, but by that time you have progeny of the inferior ewes already, so you get the bad points from the parents transmitted to the younger generation; therefore it is most important in sheep breeding to cull all the weeds from your breeding ewes. A weeding process must continually be practised, and in order to be of assistance to the country the weeds should not be sold to your neighbour. Another practice amongst farmers is to rear merino sheep from bastards. Life is too short and time too precious for that idea.

# Experiments with Ostriches—XXII.

## THE DEVELOPMENT OF THE FEATHER, SHOWING ABSENCE OF CRUELTY IN CLIPPING AND QUILLING.

By Professor J. E. DUERDEN, M.Sc., Ph.D., A.R.C.S., Rhodes University College, Grahamstown.

OWING to the recent allegations that cruelty to the ostrich is involved in the ordinary operations of clipping the feather and drawing the quills it is highly desirable that ostrich farmers should have an accurate conception of the nature of the feather, so as to be in a position to refute on physiological grounds such false charges. This can best be gained by studying the feather throughout its development and growth.

The following diagrammatic figures of the feather in its various stages of development have therefore been prepared by the writer, and with their explanations should give a clear idea of all that is involved in the operations both of clipping and quilling.

## THE SKIN OF THE OSTRICH.

The feather is a growth from the skin, just like the hairs and nails in ourselves, in fact, it is to be regarded as a highly specialized part of the skin. Therefore to understand the nature of the feather one must have at least an elementary knowledge of the structure of the skin.

The skin of the ostrich, like that of all the higher animals, is made up of two parts, the *epidermis or outer skin* and the *dermis or under skin.* These are arranged in two layers, but are so closely joined together that when an animal is "skinned" the two come off together, only a loose tissue connecting them with the muscle layers below. It is in this loose connective tissue, called subcutaneous tissue, that the thick layer of fat accumulates in well fed animals. The skin of birds is thinner and more delicate than that of most other animals, but in ostriches well cared for thick layers of fat are found beneath it. A strong network of muscle occurs in the deeper layers of the skin. The muscle fibres are connected with the feather sockets, and on contracting cause the feathers to stand erect during very hot weather.

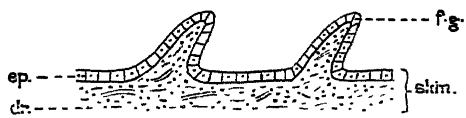



Fig. 1.—Earliest stage in the development of two feathers of an incubating chick. The feather-germ (f.g.) is at first merely an upgrowth of the skin, consisting of the epidermis (ep.) surrounding a similar projection of the dermis (dr.). The epidermis does not yet show the division into sheath and feather layers, but is covered with a thin epitrichial layer not represented in the figure.

The outer skin or epidermis is itself made up of two layers, an outer, called *the horny or corneous layer*, and an inner or *Malpighian layer*. The former consists mainly of dead horny cells and the latter of living active cells, but the passage from one to the other is not sharply defined, the living inner-layer cells gradually becoming dead, outer-layer, horny cells. In studying the feather it will be best to call the horny layer the *sheath layer* and the Malpighian layer the *feather layer,* for it will be seen that they respectively give rise to these parts. Each feather is formed from a special group of cells in the feather layer termed the *feather-germ*, and new feathers are always formed below the old ones, each from a germ which is cut off from the germ of the old feather.

For purposes of this paper it is important to realize that the epidermis or outer skin is entirely devoid of blood-vessels, and that only extremely fine nerve branches pass into its lowermost part; so that for practical purposes the outer skin may be described as without blood-vessels and nerves, and therefore incapable of any bleeding or hæmorrhage, and likewise incapable of feeling pain. The dermis, on the other hand, is richly supplied both with blood-vessels and nerves, and it is from the blood contained in it that the epidermis receives its nutrition. In a cut with a knife or razor no bleeding occurs, and no pain is felt so long as the edge does not pass through the thin epidermis, but once the blade reaches the dermis hæmorrhage takes place and pain is felt,

The parts of the skin may, therefore, be arranged in the following manner:—

Skin of Ostrich.
- *a.* Outer skin or epidermis; without nerves and blood-vessels.
  - *a.* Outer horny or corneous layer, or sheath layer.
  - *b.* Inner Malpighian layer, or feather layer.
- *b.* Under skin or dermis; with nerves and blood-vessels; the nourishing layer to the epidermis.

The surface of the skin in a healthy ostrich is continually shedding the dead cells of the outer horny or sheath layer, while the living cells in the lower Malpighian or feather layer continue to divide throughout the lifetime of the individual, forming new cells which are gradually pushed outwards to the surface to replace those lost. On their way towards the surface the cells undergo a great change and become dead and horny. This constant shedding of dead cells serves to keep the surface of the skin clean. Where, however, a

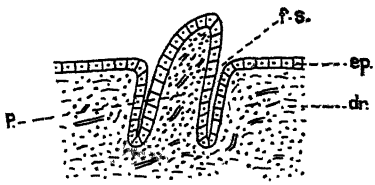



Fig. 2.—Second stage in formation of a single feather. The germ which atfirst projected about the surface now sinks down into the substance of the skin, the cavity which it occupies being the feather socket or follicle (f.s.). The portion of the dermis (dr.) enclosed within the epidermis (ep.) becomes the pith or medulla or pulp (p.) which nourishes the growing feather.

bird is not in good condition the cells do not flake off or are not cleaned off by the bird with its beak, and a dry harsh scurf is formed on the skin, just as in ourselves when bathing or rubbing the skin is impossible.

It has been shown elsewhere that the character of the surface of the skin is an important aid in enabling the farmer to determine whether or not the bird is ready for quilling or for feather growth generally. This arises from the fact already stated that the skin and feather are really one and the same tissue; conditions which influence the skin influence also the feather. Where the skin is dry, harsh, and scurfy, especially seen on the chest, under the wings, and on the legs, the bird is not in as healthy and vigorous a condition for starting a feather crop as when the skin is fresh, clean, and bright in colour. In the former state the skin is not active and the feather crop will not start well, while in the latter condition the skin is well nourished, its cells rapidly divide, and feather growth will proceed successfully.

## THE DEVELOPMENT OF THE FEATHER.

The earliest stage in the formation of feathers occurs long before hatching, for by the time the chick leaves the shell the down feathers,

representing the natal or birth plumage, are already fully grown. At a certain stage the naked body of the developing chick shows small cone-like projections or papillae on its surface which are the first rudiments or germs of the feather. Two of these are represented in Fig. 1, taken from a microscopic section of a chick long before its time of hatching. It is seen that the epidermis rises up from the surface and is followed by the dermis. At this early stage the epidermis is represented only by a single layer of cells, the separation into outer sheath layer and inner feather layer not having yet taken place.*

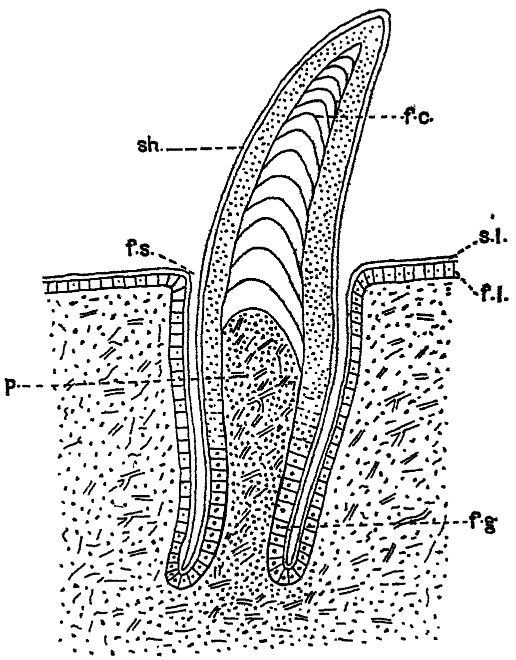



Fig. 3.—Much later stage in growth of feather, showing epidermis separated into sheath layer (s.l.) and feather layer (f.l.). Tne term feather-germ (f.g.) is now restricted to the lowermost cells within the socket (f.s.) which are in an active state of multiplication and growth, and push the rest of the feather further and further out of the socket. The cells of the feather layer above the germ cells, represented by dots, become horny and gradually change into feather material, the change being most complete towards the tip. The whole feather is enclosed in the sheath (sh.) which also becomes horny. The pulp has retreated from the upper part of the feather which is now nearly ripe and not in need of nutrition. It is gradually cut off by means of the horny feather cones (f.c.).

The next stage is where the feather-germ begins to sink downwards into the skin, as shown in Fig. 2, the epidermal layer following all the way. The germ is thus contained in a small rounded pit in the skin which is the origin of *the feather socket* or *follicle*. The socket is, of course, lined with epidermis all the way. The feather-germ surrounds a plug of dermis which provides it with nourishment

* The surface of the epidermis is, however, covered with a very thin layer of cells, called the *epitrichium*, but as this takes no part in the formation of the feather and disappears later it need not concern us.

for its growth. This may even now be known as *the pith or medulla or pulp of the feather*, and it must be clearly borne in mind that the feather is formed entirely from the epidermis, the dermal pulp merely giving nourishment to its cells.

The germ sinks deeper within the socket and also grows further beyond the mouth of the socket by the rapid multiplication and growth of the epidermal cells at the lower end (Fig. 3). At the same time the entire epidermis begins to show a separation into the outer sheath layer and the inner feather layer. The upper cells of the young feathers now start to undergo the great changes which ulti-

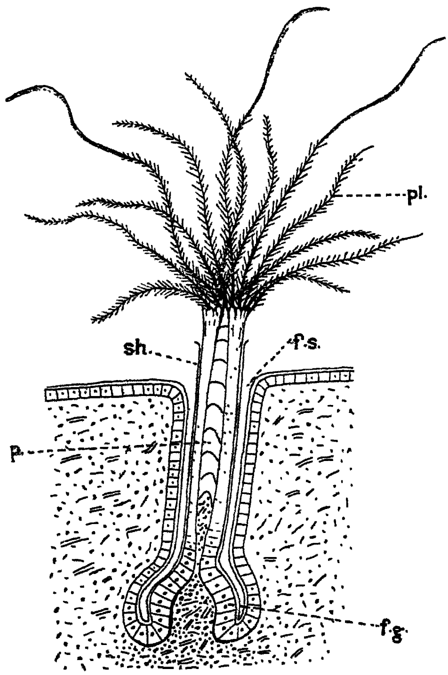



FIG. 4.—Feather at the time of chick hatching. The sheath (sh.) has broken away from the upper part of the feather and liberated the plumules (pl.) of the natal or birth feathers. These all come off at the same level, not from a central shaft, as in the later feathers. The short thin quill is still partly within the socket (f.s.), but its pulp (p.) is being cut off by feather cones. Towards the bottom of the socket the quill narrows and ends, but is continuous with the germ of the new feather (f.g.) already formed below. Later, as the new feather, the spadona, develops from its germ it will gradually push out the down feather, carrying the tuft of down at its tip.

mately convert them into actual feather material, closely resembling horn in its nature,* and the material is arranged in definite wedges which in the end give rise to the barbs and barbules, these alone making up the first feather.

The latest stage is where the growing feather, pushed further and further out from the socket by the continued multiplication of

* Keratin is the chemical substance which largely makes up the substance of feathers. The same proteid compound is contained in most horny substances produced by the epidermal cells of the skins of other animals, such as hairs, nails, hoofs, and horn.

the cells below, breaks through its delicate outer sheath and expands into barbs and barbules (Fig. 4). This is the feather stage at which the chick is hatched. Its body is covered with light and dark brown feathers which on drying project from the surface and form an efficient covering for warmth and protection to the chick.

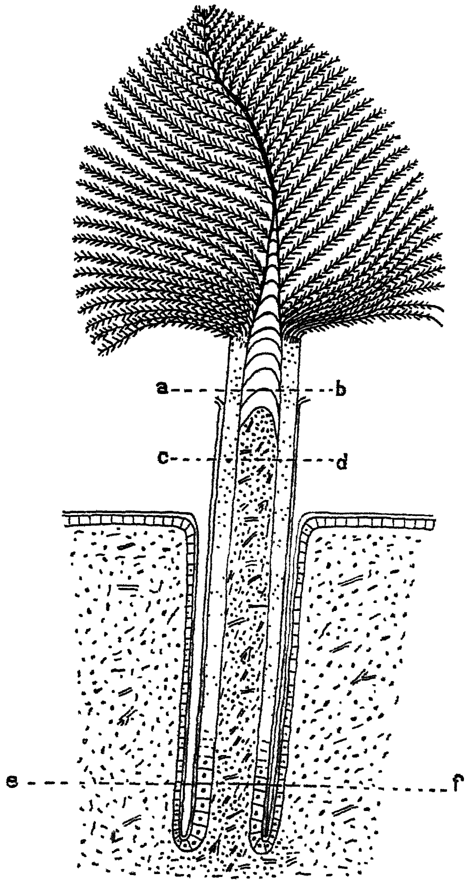



Fig. 5.—A partly grown adult feather. The horny sheath has already been preened away above and allows the part of the plume which is ripe to expand. The feather-germ at the bottom of the socket is still active, and the plume will be pushed out for some distance before reaching its full length. The pulp extends a little distance beyond the mouth of the socket, but is cut off above by the transverse feather cones. The cones, as part of the medullary sheath, extend some distance up the shaft of the opened part of the plume. If the feather were clipped along the line *a b* no bleeding would occur, but if along *c d* the blood-vessels in the pith would be cut through and haemorrage would take place. If the blood feather were accidentally trampled out at this stage it would break off about the level *e f*, where the tough horny matter of the feather is beginning to form, and leave the feather germ behind, which would then form a new feather to take the place of the one lost.

The natal feathers are fully formed at hatching, and do not extend to the bottom of the socket. They have in fact been pushed partly outwards by the growing germ of the next feather, the definitive feather, which forms in the same socket below the first feather; for

it is found that the tip of the new feather, the spadona, begins to show through the mouth of the socket within a week or two after hatching.

The material of the two feathers, the natal down feather and the spadona, is, however, continuous; hence it comes about that at the tip of the spadona, even when fully expanded, the natal feather is

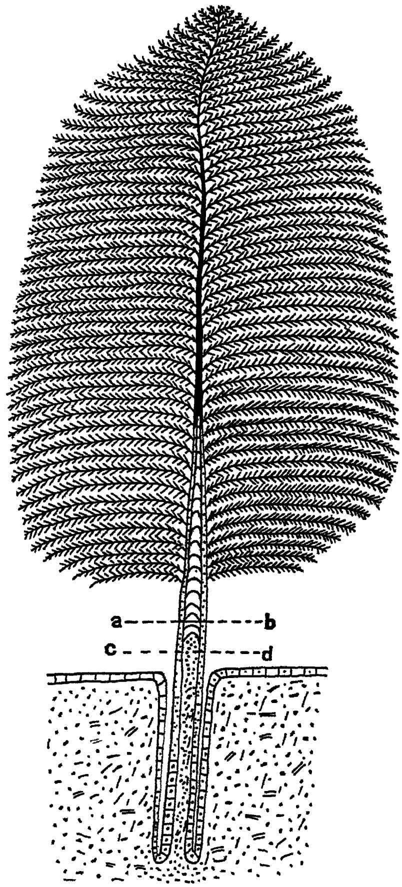



Fig. 6.—A fully ripe adult plume showing the stage at which it is clipped. The quill is ripe for a short distance above the mouth of the socket, but is still green and in process of growth below the surface of the skin. The pulp extends up the quill a short distance beyond the lip of the socket. The feather is clipped along the line *a b*, that is, above the pulp through the ripe part of the quill; if clipped along *c d*, that is, through the pulp, bleeding would occur. The feather-sheath is omitted for the sake of clearness.

also present as a small tuft. The condition of the two feathers at the time of hatching is diagrammatically shown in Fig. 4, the natal feather fully formed, the spadona just beginning. The middle pulp of the two is also continuous.

As the new feathers always come from the same sockets as the old ones it will be understood that the newly-hatched chick has just as many feathers as the adult bird will ever have, though the first

feathers are of a different kind from those which appear later. Also in the case of natural moulting the new feather bears the old one at its tip until the latter breaks off; the natal feather in the ostrich does not, however, break off from the spadona.

### THE GROWING FEATHER.

Having now some idea of how the first feathers are developed from the skin we can better understand the different parts of a mature growing plume. One of these is diagrammatically shown in Fig. 6. The feather is supposed to be only partly grown, being a little opened out above but unformed or "green" below. The germ cells at the

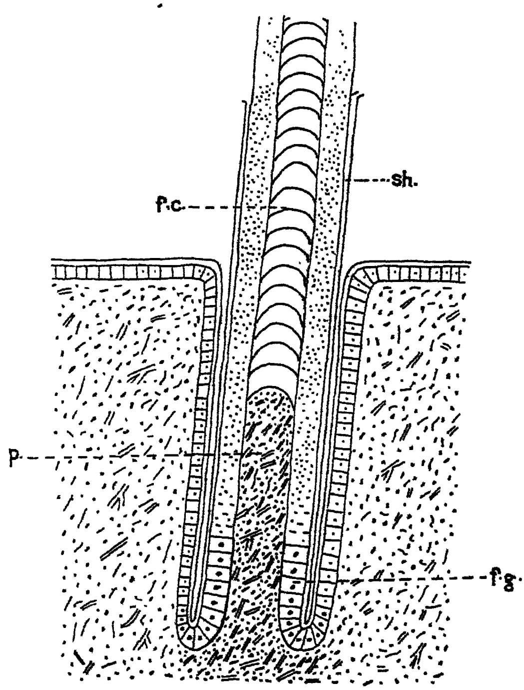



Fig. 7.—A quill in process of ripening within its socket after the plume has been clipped. The quill after clipping is pushed further above the mouth of the socket by the continued growth of the germ (f.g.) below until the full length is reached. The pith (p.) gradually recedes lower and lower, being cut off by the feather cones. Complete ripening takes about two months after the plume is cut.

bottom of the socket are still increasing in number and growing in size, thereby pushing the feather further and further out of the socket. Beyond the soft cells of the germ the feather cells and sheath cells are becoming changed into horny material which ultimately forms the shaft, barbs, and barbules of the feather, as well as the sheath. For some distance beyond the lip of the socket the feather is surrounded by the horny feather sheath, but as this dries and cracks it is preened away by the beak of the bird and thus allows the feather to expand as shown.

It is most important to understand the condition of the pith or medulla with its nourishing blood and nerves. It extends as a red,

worm-like plug up the middle of the growing feather, reaching some distance beyond the mouth of the socket. It stops, however, before reaching the part where the feather expands, being cut off by a successive series of horny cones which fit over one another at the sides. These cones are part of the pith or medullary sheath, which can be seen in the opening plume as a dry thin horny tube along the groove of the shaft, containing all that remains of the soft medulla, which originally extended to the tip of the feather. The part of the tube from one cone to another is now filled only with air, the cones having formed over the tip of the medulla as the feather grew upwards, thereby preserving it from exposure. The sheath and cones are ultimately preeened away by the bird.

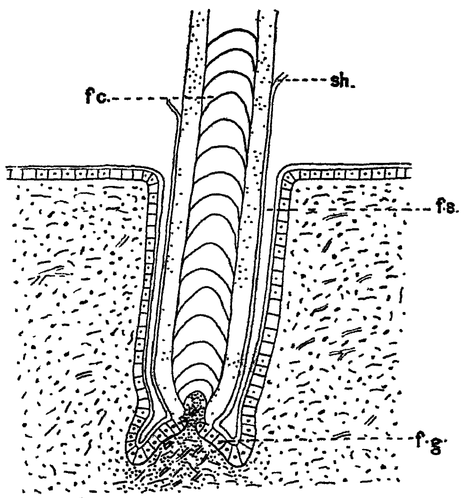



Fig. 8.—A fully ripe quill within its socket (f.s.). All the pulp with its blood has receded from the quill, having been successively cut off by the feather cones (f.c.), with the exception of a small plug at the extreme tip. The quill is therefore never wholly cut off from the dermis but communicates with it through the aperture at the tip, called the inferior umbilicus. Below the tapering end of the quill is seen the germ of the next feather (f.g.) which will become active as soon as the quill is drawn and in time give rise to a new feather. The old quill is not altogether cut off from the new feather germ, but soon breaks off after the new feather projects beyond the socket.

Thus, as the figure shows, the part of the growing feather above the medulla is now fully formed feather material and has no longer any need for the nourishing blood. It is dry, horny, dead material, in so far as we can speak of our hair and the tips of the finger nails as being dead. Like these it has no blood within it, and also like these there can be no feeling or pain if it be cut. The part of the feather as far as the medulla extends is, however, not yet fully formed and requires the blood for its nourishment.

Such partly grown feathers with the blood within them are known as blood feathers, or, technically, as "bloods." Suppose now a feather at this stage were clipped. If the severance were made above the medulla, say along line *a b*, no hæmorrhage would occur, for the medulla along with the blood in it has receded and been cut off; likewise no pain would be felt for the feather material is changed

into horn and contains no nerves. If, however, the feather were clipped below the tip of the medulla, say along the line *c d*, then copious bleeding would take place owing to the blood-vessels of the medulla being cut through, and it may be presumed the bird would also feel something.

Occasionally growing blood feathers about this stage are accidently plucked or trampled out. In this case the feather breaks off from the germ at the point where the soft feather layer is changing to tough horn, as at the line *e f*. The medulla also breaks away at the same place, and can be seen in the middle of the blood feather as a red, soft, fleshy pulp; it may even be drawn out of the tube as a long tapering piece of tissue. It is important to note that when a blood feather is drawn another is sure to appear in its place, for the soft germ is left at the bottom of the socket, and at once proceeds to form a new feather. This is, however, usually an inferior one, full recovery only taking place with the next crop.

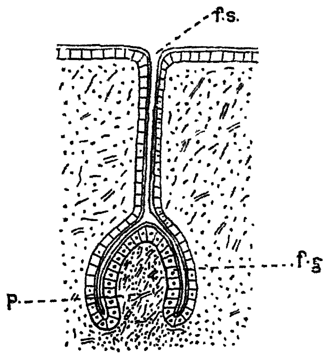



Fig. 9.—A feather socket shortly after the drawing of the quill The walls of the feather socket (f.s.) have come together, practically closing up the tube. At the bottom is seen the new feather germ (f.g.) now beginning to grow upwards through the old socket and nourished by the pulp or medulla (p.). In a month's time the tip will extend as far as the mouth of the socket, and about five months afterwards a new feather will have grown.

## THE RIPENED PLUME.

A ripened feather is one which is ready for clipping. Its structure and relationships with the skin and medulla are shown in Fig. 6. The plume is fully expanded, the sheath having been altogether preened away. The uppermost part of the quill immediately below the plume is also ripe, but its lower part within the socket is still green and in process of formation. The pith extends a short distance beyond the mouth of the socket, and on the bird can be seen as a red streak through the inner transparent face of the quill. As the red pith recedes down the quill it is cut off by successive horny cones, and can be seen to disappear slowly day by day, leaving more and more of the quill without blood.

The plume is clipped at this stage. The separation takes place about the line *a d*, that is, just above the point to which the medulla extends. By cutting at this level it will be seen that no hæmorrhage can occur, as the feather above the pith is only dead horny material

from which the blood has drained away; likewise there can be no feeling or pain of any kind to the bird, any more than when our hair is cut or we trim our nails.

The quill, however, is not yet ripe, and is therefore allowed to remain in the socket until such time as it completes its growth. Were the plume allowed to remain on the bird until the quill also ripens it would depreciate greatly in value by the long wear and tear and exposure; therefore it is clipped as soon as it has unfolded from the sheath.

Thus the plumes are taken as soon as fully formed, the cut passing through the uppermost part of the quill which is also fully ripe. Were the plume to be clipped through the unripe part of the quill, that is, the part still with blood within it, then bleeding would take place, but this is avoided by the farmer for fear the next feather may suffer. Thus there can possibly be no cruelty to the bird involved in the operation of taking the plumes.

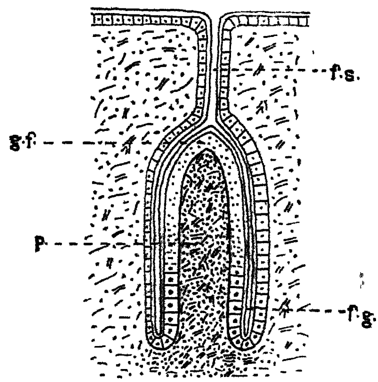



Fig. 10.—Later stage in growth of the same germ as in fig. 9. The growing feather (g.f) becomes cornified at the upper end, long before it pushes through the mouth of the socket (f.s.), but the germ below (f.g.) which is always adding new cells remains soft. The pulp (p.) follows the growth upwards, supplying the growing cells with nourishing blood.

## THE RIPENING QUILL.

After clipping the plume the quill is left in the socket to complete its growth. The process takes about two months from the time the feather is clipped. The germ is still active at the bottom of the socket, and the added cells from it push the quill still further out of the socket. At the same time the pith recedes more and more within the socket as the quill completes its growth, being cut off by successive feather cones, as shown in Fig. 7.

As the quill ripens it becomes narrowed and rounded off towards the tip, which is situated at the bottom of the socket (Fig. 8). The pith withdraws entirely with the exception of a small plug at the end, and the middle of the quill is hollow, but divided into separate compartments by the thin horny feather-cones. The cones can easily be seen through the transparent half of the quill.

Below the ripened quill is seen the new feather-germ which will give rise to the next plume when the old quill is removed.

### DRAWING THE QUILLS.

This is the only operation in ostrich management which can in any way be supposed to suggest cruelty to the bird, but a close consideration of the conditions, as revealed in Fig. 8, will show the utter groundlessness of the supposition. The quill is altogether ripe when drawn and consists of so much dead horny material. Were it not so deeply fixed within the socket it would fall out of its own accord with no pain to the bird, just as do the dead hairs from our head. Were it allowed to remain in the socket the new feather-germ below would in time become active and gradually push the old quill out, exactly in the same manner as in the natural moulting of the feather.

The awakening to activity of the new germ might, however, be long delayed, and it is certain the process would not begin simultaneously for all the sockets of the wing. Irregularities in feather growth would thus be introduced, and this the ostrich farmer strives by every means to avoid. This is done by artificially drawing the quill, thereby performing for the bird what he himself would accomplish, but in a more leisurely and irregular fashion. It is a hastening of nature's process in order to secure a complete and even crop.

The dead quill is usually so loose that it can be easily extracted by grasping with the hand and supporting the socket with the finger and thumb. In other cases ordinary pincers are used to perform the operation. The bird appears quite unconcerned during the drawing of the quills and gives no evidence of any feeling. The extracted quills are of no use and are thrown away.

The small plug of pith at the tip of the quill comes away with the extracted quill, and rapidly dries up, leaving a small opening at the end of the quill, known as the *inferior umbilicus*. No hæmorrhage occurs as a result of its severance from the rest of the dermis.

Very rarely there comes out along with the quill a thin white horny sheath attached to the tip of the quill and also to the lip of the socket. The nature of this is not generally understood by ostrich farmers, but can be gathered from a study of Fig. 8. It will be seen here, as in the other figures, that the sheath of the feather is continuous with the sheath or lining of the socket, both, in fact, represent the same layer, namely, the outer or sheath layer of the epidermis. When, therefore, the quill is drawn out, surrounded with its own very thin sheath, the sheath of the socket continuous with it may also come out, and we have the empty socket left without any lining. The occurrence is, however, very exceptional, and only mentioned here on account of its structural interest.

### GROWTH OF THE FEATHER AFTER QUILLING.

After the quill is drawn the walls of the socket collapse, having nothing to support them. Usually the surface of the wing is smeared with oil or vaseline to protect the sockets from exposure, to soften the skin, and to stimulate the new growth. Fortunately for ostrich farming the removal of a quill at once awakens the new germ to activity, and it sets about to produce a new feather (Fig. 9). Very rarely, if the bird be not in good feather growing condition, the new germ does not become active after quilling, and the socket remains without a feather, either temporarily or permanently. "Blanks," as such sockets are termed, are much dreaded by ostrich farmers, as each represents the loss of a plume.

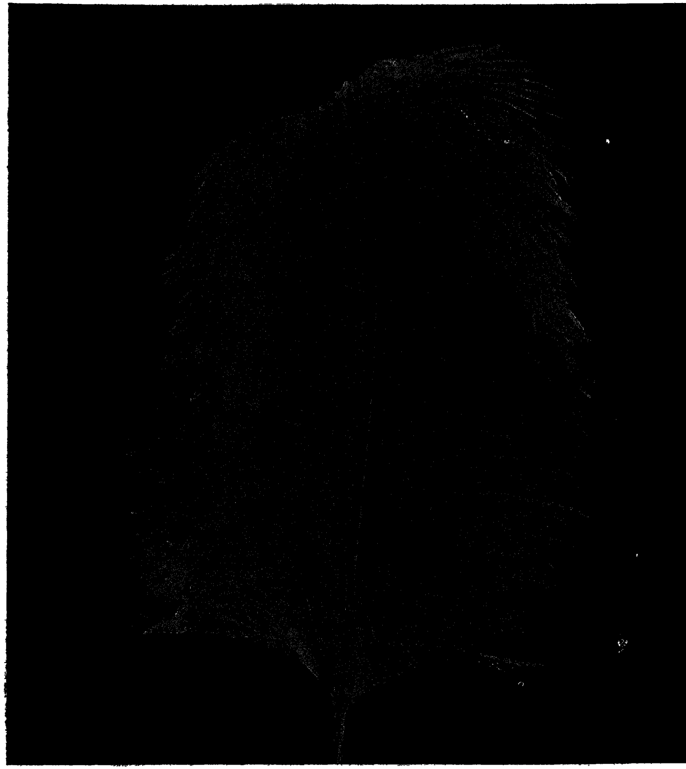


Fig. 11.—A blood feather showing the lower part of the plume still enclosed within the feather sheath, and the lowermost plumules not fully expanded.

Fig. 12.—A fully ripe plume clipped, as shown in fig. 6, through the ripe portion of the quill. The medullary or pulp sheath with the feather cones within it extends a short distance up the shaft, having not yet been preened away.

*Plate No. LXV.*

Ordinarily the germ cells multiply rapidly and enlarge, and gradually the new feather grows upwards, opening out the old socket as it proceeds (Fig. 10), until, in about a month's time from quilling, it appears at the mouth of the socket. The cells away from the germ are gradually converted into the horny feather material and form the plume surrounded by its sheath, and later the feather opens out in its full glory as before.

Very rarely, and only in birds in poor condition, the mouth of the socket will not open to let out the new feather, and the latter then continues its growth underneath the skin and gives rise to an abscess-like swelling. A simple operation, cutting through the skin and straightening out the crumpled feather, generally results in recovery.

## CONCLUSION.

From the foregoing account of all that is involved in the operations of clipping and quilling ostriches it is manifest there can be no question of any cruelty whatever. When clipped the ripe plumes are so much horny material which would ultimately be cast off by the bird in the natural process of moulting. The ripened quills are also dead horny parts of the skin, and their extraction means no more to the bird than the falling out of the dead hairs in the daily process of brushing the head. There can be no possible objection on the score of cruelty to the quilling of ostriches any more than there is to the clipping of the plumes. As far as concerns the bird both are dead horny structures, without nerves and blood-vessels.

It is not claimed there are never any instances of cruelty to be adduced in the management of ostriches. Farmers have been known to clip plumes before they are fully ripe, cutting through the pith and thus causing hæmorrhage; occasionally a quill may be drawn while yet some way from ripeness. In North Africa the plumes are said to be plucked as a whole before they are ripe, and are taken from the body as well as from the wings and tail. There are no relationships in life where some cruelty is not experienced at times. Some men are cruel to their dogs, some to their horses and cattle; cruelty is involved in the shooting of game; some men are cruel to one another, others to their children or to their wives. In estimating whether any cruelty is involved in any animal industry one must consider the general methods according to which the industry is conducted, not the exceptional cases. If this be done as regards ostrich farming it will be found there is no practice involved which by the widest stretch of the imagination can be considered as having a suggestion of cruelty in it. As the writer has remarked elsewhere the domesticated ostrich is the most pampered animal in existence; and the farmer knows full well that any ill-treatment is detrimental to his own interests.

# Pernicious Scale.

## THE PRESENT POSITION.

By C. P. Lounsbury, Chief of Division of Entomology.

It is now a little more than two years since pernicious (San Jose) scale, which has the reputation of being the most serious of all the numerous scale pests of deciduous fruit trees anywhere in the world, was discovered to be present in South Africa. For a time considerable alarm prevailed amongst fruit growers. At first the Government decided to attempt the eradication of the new pest, and with this object in view it caused the cutting out and burning of about 860 infested trees and about 1460 hedges and other plants, chiefly in Pretoria and its environs. A fuller realization of the immensity and expensiveness of the undertaking which it had embarked upon led in late October, 1911, to the cessation of the general eradicative measures pending an exhaustive inquiry into the distribution of the insect and the probable cost of securing the destruction of all infested and suspected vegetation. The inquiry was pursued until April, 1912, and the Government then definitely decided to abandon the original project and to leave the eradication or suppression of the pest on any particular property to the enterprise of the occupier or owner.

The dissemination of the pest was due wholly or in large part to purchases of trees from one nursery at Pretoria and one at Pietermaritzburg, and had been taking place at least since 1906. Most occurrences trace to the Pretoria nursery, but there is evidence that the Pietermaritzburg nursery was earlier infested and some reason to suspect that the former nursery was originally infested from the latter. At the same time, however, there is a possibility that the establishment of the pest at a few places—as at Standerton (Transvaal) and Frere (Natal)—preceded its establishment in either nursery. In the course of the general inspection prior to the abandonment of the eradication policy almost all of the surviving suspected stock sold from the two nurseries was traced and examined, and an erf to erf inspection made of Pietermaritzburg, of Pretoria and its environs, and of several smaller towns; and thus the whereabouts of the pest became fairly well known.

The occupier of every infested property was urged in the winter of 1912 to do his utmost to suppress the pest, and a similar appeal for action was issued in the present season. Further, one or more visits to nearly all known infested places, except to those in Standerton, have been made during the past year in order to ascertain what is being done to check the pest and in order to advise the occupiers relative to the position and to stimulate their interest. Moreover, the local governing bodies have been approached—in the case of towns and villages in which infested gardens are known—with the view of inducing them to use coercive measures to secure satisfactory action.

The response to the appeal for suppressive action was on the whole gratifying, but, as had to be expected, many occupiers of infested property took no action at all and many others sprayed to little effect, probably owing to slovenly application. Lime-sulphur wash and "Scalecide" were the spray fluids chiefly employed, and both proved highly efficient, the results in the case of many individual trees appearing to be perfect six months or more later. The Scalecide seems to have given good results more consistently, doubtless because it is a simpler matter for an inexperienced party to apply it so thoroughly that every portion of the tree is coated. A large number of parties cut down the trees that were known to be infested and sprayed the surrounding ones. The Government had applied stamping-out measures in October, 1911, on a private property at Richmond, Natal, and later on Government properties at Viljoens Drift, Orange Free State, and these measures appear to have been successful in their object, no scale having since been detected. Further, no scale has been found at recent inspections of a number of properties where in the general inspection only a few very young trees were found to be infested and were at once destroyed.

Neglect of the scale has been the rule rather than the exception in the case of rented town properties, especially in the poorer parts of Pretoria and at Standerton. The occupiers as a class are indisposed to spend anything at all for the preservation of the trees in their gardens, and the trees as a rule represent no money outlay to them, they for the most part being seedling peaches or trees put in by former occupants. A surprising number of the properties in and about Pretoria are now occupied by different tenants than a year ago, and most of the new tenants when recently called upon were found to have no knowledge of or interest in the pest.

The climate of the high and middle veld evidently suits the scale very well indeed, and it is to be feared that the climate in all parts of the Union where deciduous fruit trees thrive would also prove quite favourable to its welfare. The measures which the Government is taking in regard to nurseries and plant traffic may reasonably be expected to restrain the spread of the pest over the country to a very marked degree; but there is no hope that they will prevent its slow extension into all the gardens in the towns where it has become established and its eventual spread to other towns and on to farms. It will spread fast or slowly dependent on the steps taken locally to hold it back. Seasonal conditions will also play an important part. It is very noticeable that the scale did not flourish last year in many gardens near Pretoria that suffered severely with drought, but it is not expected that the setback is more than a temporary one; in nearby gardens under irrigation the pest increased considerably where neglected.

The experience of the past year has amply demonstrated that spraying as a suppressive measure is cheap and highly satisfactory, and has also demonstrated that good spraying has a very decided value in retarding local spread. One thorough spraying every winter is evidently all that is required to prevent damage to a tree; but two or three thorough sprayings in one winter may be necessary to get the pest well under control in the case of trees which have been allowed to become badly infested by neglect in one or more years.

The measures that the Government is applying to prevent the

rapid dissemination of the insect are chiefly those relative to nurseries and plant traffic applied to check the spread of plant pests in general. More attention than ever before is being given to nursery inspection in all of the Provinces, and the nursery inspectors are keenly on the alert for pernicious scale. No occurrence of the pest in any nursery in the Union, except the two alluded to above, has come to light, and it is now over eighteen months since those were dealt with effectively. The Government burned all the susceptible stock of the Pretoria nursery, compensating the owner for the loss of what appeared to be free of the pest, and arranged for the abandonment of the property for the propagation of susceptible stock. The Pietermaritzburg nursery was infested to a very slight extent only when the pest was discovered there, and probably never had been much infested, and the extensive burning out measures applied by the owner appear to have sufficed for its utter eradication.

Drastic restrictions, other than in respect to nursery stock, now apply to the removal of plants by rail or post from one part of the Union to another; and if railway and postal officers who accept parcels of non-certificated plants for conveyance carry out official instructions they invariably have the parcels sent to an Agricultural Department plant inspector for examination before permitting them to go forward for delivery. The plant inspectors are empowered to turn back plants objectionable because of pest infestation, and they must fumigate (as a precautionary measure) all deciduous and citrus fruit trees. The special instructions relative to plant traffic were given to railway and postal officials by the heads of their own departments, and they are repeated from time to time. As a further step towards their being kept in mind by railway officers, two thousand copies of a large placard detailing the requirements were recently distributed for posting at railway stations.

Special legislation applies to Pretoria as a check on the spread of pernicious scale, it being illegal to remove any plants from there without the written permission of the Department of Agriculture. It is also illegal to remove any woody plants from a property known to be infested with the insect anywhere in the country, and the occupiers of the properties known to be infested were recently reminded of the fact.

The following statement shows where the pest is now known in the country, and, in a general way, what the position is (July, 1913) at the several centres. The general inspection referred to that made between August, 1911, and April, 1912. It is probable that most of the places where no live scale is recorded to have been found at the recent visit are still infested to a slight extent:—

TRANSVAAL.

*Pretoria and nearby townships*:—

Town Centre.—Main outbreak in the town due to local sales and to spread from nursery where the pest for first time recognized, July, 1911, on growing trees in South Africa. Pest supposed to have been introduced in 1905 or 1906. At general inspection about 1400 plants and eighteen hedges on about seventy properties, scattered over about eighty-five acres, more or less infested. Nursery practically abolished and infested trees on about twenty-eight properties destroyed, 1911. Spraying on about thirty-one properties carried out in 1912. In 1913

scale found to have spread on to most remaining properties within its 1911 limits, eighty-three additional properties being found to be infested, and limits of infested area seem to have considerably increased. Conditions on whole in 1913 very much worse than a year before, but some properties, once badly infested, now practically clean owing to spraying. Detailed report on this and other parts of town made (July, 1913) to Town Clerk and consideration of municipal action urged.

Railway Reserve.—At general inspection twenty-five infested trees found on three properties. Introduction, 1908 (?). Infested and suspected trees destroyed by Railway Department and surroundings sprayed, 1912. No live scale found, 1913.

Pretoria West.—At general inspection three centres involving 145 infested trees on twelve properties found. Introduced 1908-11. Known infested trees destroyed on five of the properties and eight sprayed, 1912. No live scale found on five, and much on one only, 1913. Very little spread.

Arcadia (including Eastcliffe, Bryntirion, etc.).—At general inspection eleven centres involving 370 infested trees on twenty-three properties found. Introductions, 1908 and later. Known infested trees destroyed on sixteen properties, and satisfactory action taken on all properties except one minor one, 1912. Known infested trees on the exception since destroyed and surroundings sprayed. No live scale found on fourteen of the properties, and seven of them believed absolutely free of the pest, and scale nowhere found bad or being neglected, 1913.

Sunnyside.—At general inspection five centres involving twenty infested trees on five properties found. Introductions, 1909 and later. Known infested trees destroyed on four of the properties and effective action taken on all, 1912. No live scale found, 1913.

Hatfield.—At general inspection seven centres involving fifty-two infested trees on ten properties found. Introductions, 1908 and later. Infested trees destroyed on five of the properties and two places sprayed, 1912. No live scale found on six of the properties and not very much on any, 1913. Spread slight.

Hillcrest.—At general inspection one centre involving fifteen infested trees on two properties found. Introduction 1908 or 1909. Both places sprayed, 1912. No live scale observed at one, and only moderate infestation at other, 1913. No spread noticed.

Brooklyn.—At general inspection nine centres involving fifty-two infested trees on eleven properties found. Introduction, 1908 and later. Known infested trees on eight of the properties destroyed and five places sprayed, 1912. Live scale detected on only two of the places, 1913. No spread noticed.

Muckleneuk.—At general inspection three centres involving fourteen infested trees on three properties found. Introduction, 1909 and later. Infested trees on principal place destroyed, 1912. Live scale found on all three places, 1913, but not abundant. No spread noticed.

Riveria.—At general inspection two centres involving nine infested trees on two properties found. Introduction, 1907 and later. Known infested trees destroyed or well sprayed, 1912, and no live scale found there, 1913. Additional centre of one property with five infested trees discovered, 1913. Sprayed at once.

Claremont.—At general inspection sixteen trees on one property found infested. Introduction, 1908. Sprayed, 1912, and no live scale detected, 1913.

Daspoort.—At general inspection 139 trees found infested on five properties, all separate centres. Introduction, 1907 and later. Known infested trees destroyed on all places. Two sprayed, 1912. A little live scale found two places only, 1913. Spread to one additional property detected.

Daspoort Estate.—At general inspection forty-two trees found infested in one centre on three properties. Known infested trees destroyed and two places sprayed, 1912. Much live scale found on about ten trees at one place, and a little on a number of trees at both other places, 1913.

Pretoria Gardens.—At general inspection twenty-five infested trees found at two centres involving five properties. Known infested trees destroyed at two principal places and three places sprayed, 1912. A little live scale found on all five, 1913.

Mountain View.—At general inspection fifty-one infested trees found in one centre involving seven properties. Introduction, 1908 (?). Infested trees destroyed at two of places and one place sprayed, 1912. Live scale found at six, and very abundantly on two, places, 1913.

Parktown.—At general inspection eighty-three infested trees found at four centres on five properties. Known infested trees destroyed at one place and two places sprayed, 1912. Live scale found very abundant on one property and at least present on three others, 1913.

Roseville.—At general inspection three infested trees on one property found. Conditions apparently no worse in 1913.

Mayville.—At general inspection 164 infested trees in one centre on two properties found. Introduction, 1908. Known infested trees destroyed, 1911. Both places sprayed, 1912. Little scale detected at one place, 1913.

Les Marais.—At general inspection fifty-eight trees and four quince hedges found infested in one centre on seven properties. Introduction, 1908. Principal place denuded of known infested vegetation (fifty-two trees and one hedge), and the few known infested trees (four) on two other properties also destroyed, 1911. Two minor properties sprayed, 1912. Scale found on five of the properties, very abundant on three, in 1913. Probably also spread to other properties.

Wonderboom South.—At general inspection sixty-six trees and a quince hedge found infested on one property and one tree on another. Introduction, 1908. All trees at latter place removed. Former place sprayed, 1912. Only a little scale detected, 1913.

Gezina.—At general inspection 223 trees (nearly all small) and four quince hedges found infested on seventeen properties in seven centres. Introduction, 1907-11. Ten places sprayed, but seven neglected, 1912. Live scale found at thirteen of places, 1913, but nowhere very abundantly, which probably indirectly due to drought. Pest slowly spreading, and rapid spread probable in good seasons.

Rietfontein.—At general inspection 191 trees (nearly all small) and six quince hedges found infested on twenty-three properties in seven centres. Introduction, 1908 and later. Trees destroyed at one place, nine sprayed, and thirteen neglected, 1912. Live scale found at nineteen of places, 1913, and rather bad at three of these. Pest

not at present flourishing and spreading only slowly, which is attributed to dry season and absence of irrigation.

East Lynne.—At general inspection seventy-six trees on one property, and one tree on adjoining property, found lightly infested. Introduction ?. Minor place sprayed, but major one neglected, 1912, beyond destruction of few worst trees; yet no increase of scale, perhaps owing to defoliation of trees by drought. Scale at both places about the same as when first found.

Pretoria North.—At general inspection one tree found infested. New tenants, but probably spraying done in 1912, as only a little scale found, 1913.

*Rayton* (Pretoria District).—In original inspection two attacked trees found in large two-year-old orchard. Known infested trees and those surrounding them destroyed at once. Orchard sprayed, 1912. No scale detected, 1913, and property considered free.

*Scheerpoort* (Pretoria District).—In original inspection one outbreak found in two adjoining farm gardens. Fifty-five trees and quince hedge infested. Introduction, 1909. Infested trees (five) in one garden destroyed, 1912. Place not visited in 1913, but scale said to have spread much. Spraying promised.

*Cullinan* (Pretoria District).—In original inspection five outbreaks found on ten properties. In all seventy-five infested trees found. All fruit trees on two properties destroyed and remaining places, with one exception, sprayed, 1912. Much live scale found on the unsprayed place, and a little on six others in 1913. Premier Mine Company attending to situation.

*Bronkhorstspruit and Vicinity* (Pretoria District).—Three outbreaks found at original inspection, two in township on four properties. One hundred and twenty-two infested trees found, of which twenty-seven, all first found infested on one place, were destroyed in July, 1911. Introduction in 1908 and 1909. Two places sprayed, 1912, but all four badly infested in 1913. Many trees dying.

One outbreak on farm Vlakfontein. Fifty trees found infested in 1911. Introduction in 1908. No action, 1912. Property untenanted and neglected, but most scale dead owing to grass fire, 1913.

*Witbank and Vicinity* (Middelburg District).—Six outbreaks discovered at original inspection. Four involved—two township and three mine properties, 124 infested trees being found. Introduced, 1908 and 1909. All five properties sprayed in 1912, but apparently not properly. Live scale found on all five, 1913—abundantly at three and slight at others. Infested area increasing. Municipal action urged, and authorities state helping to best of their ability.

Fifth outbreak in farm garden near Oogies, seventy-six trees infested. Introduction, 1908. Known infested trees and other trees in same block destroyed, 1912. Scale found bad in a neighbouring block, 1913, but trees there being taken out.

Sixth outbreak in farm orchard of 900 trees near Balmoral; 119 infested trees originally found. Introduction, 1908. Trees cut back and sprayed twice, 1912. Only a little live scale found, 1913, and all trees being again sprayed.

*Middelburg and Vicinity.*—Two outbreaks found at original inspection. One in township on two properties, where nineteen infested trees were detected. Introduced, 1909. Both places sprayed, 1912. Little scale only found at both, 1913. Spraying will be kept up. Municipal Council notified relative to position.

Second in farm garden near Wonderfontein. About twenty trees infested. Introduction, 1910. Sprayed, 1912. Only a little live scale, 1913. Will continue spraying.

*Nylstroom.*—Five outbreaks involving six town properties found at original inspection. Seventy-five infested trees detected. Introduction, 1908-10. All places sprayed, 1912. Not visited in 1913. Municipal action recommended.

*Standerton and Meyerville.*—At original inspection infested trees detected on seventy-eight properties, all parts of the town being involved. Inspection not completed, but several thousand trees thought infested. An introduction of many infested trees occurred in 1907, but an earlier introduction suspected. Town Council sprayed twenty-five properties at cost, 1912, and few others privately sprayed, but most neglected. In 1913 condition on whole vastly worse than 1912. Town Council again spraying and endeavouring to get by-law to make repressive action compulsory. Pest now established in majority of gardens in the town, and in four gardens in adjoining town of Meyerville.

*Benoni.*—At original inspection the majority of about 400 trees in farm orchard (about 5 miles from town) infested. Introduction, 1907. No action, 1912, and conditions extremely bad in 1913, many trees having died from the scale. Neglect likely to continue unless owner adopts Division's recommendation to lease orchard on condition that it be well sprayed. Nearest neighbour notified of circumstances and urged to do utmost to get satisfactory action taken.

*Boksburg.*—Five outbreaks on as many town properties found at original inspection, scale being detected on fifty-five trees. Introduction, 1909-11. Infested trees at two minor places destroyed and surroundings sprayed, 1912, and no live scale found here, 1913. Trees dying of neglect at third place, and scale seems to have perished there, 1913. Fourth place sprayed three times in 1912 and no live scale detected, 1913. Fifth place neglected and live scale found extremely bad there, 1913. Municipal action urged.

*Bethal and Vicinity.*—Three outbreaks discovered at general inspection. One in town involving six properties on which 248 infested trees found. Introduction, 1908. Five of the six places sprayed, but only one properly, 1912; nothing done at sixth place. Live scale found at all places in 1913, and very plentifully at all but one. Condition very unsatisfactory. Municipal action urged.

Second outbreak in garden of about seventy trees on farm Gelukspruit; seventeen trees found infested. Introduction, 1908. Action not ascertained.

Third outbreak in orchard of about 250 trees on farm Ijzervarkfontein; twenty-four trees found infested. Introduction, 1908. Some trees destroyed and remainder sprayed three times, 1912. Considerable live scale, 1913, and better spraying promised.

Later outbreak reported July, 1912, in garden of about 400 trees on farm Kafferstad. Introduction, 1907 or 1908. Infested trees cut back and sprayed, 1912. Over 100 trees and long privet hedge found infested, many badly, 1913. More extensive spraying promised.

*Amersfoort.*—One outbreak on four township properties; 110 trees found infested at general inspection. Introduction, 1907. Known infested trees on three properties sprayed, 1912. Scale taken on infested trees to another part of town, 1912. Much spread during

year, and live scale abundant on three properties, 1913. Municipal action urged.

*Heidelberg.*—One outbreak, apparently confined to two trees, introduced in 1909, discovered at general inspection in large orchard on farm Schoongezicht. Known infested trees destroyed and surrounding ones sprayed, 1912. No scale detected, 1913. Spraying continued.

*Boskop* (Potchefstroom District).—One outbreak, apparently confined to two trees introduced in 1911, discovered at general inspection in small farm orchard. Known infested trees destroyed and surrounding ones sprayed, 1912. No scale detected, 1913.

*Johannesburg.*—Three outbreaks discovered at general inspection. One in Yeoville, apparently confined to two plants, introduced in 1909. Known infested plants destroyed and garden sprayed, 1912. No scale found, 1913.

Second outbreak on three properties in Parktown, on which twenty-six infested trees detected. Introduction, 1907. All places sprayed, 1912, but a little live scale found on two of them, and also in two neighbouring gardens, 1913.

Third outbreak on two properties in Newclare, on one of which twenty-two infested trees were found, and on the other two. Introduced in 1907. Known infested trees at minor place destroyed, and both places sprayed twice, 1912. No live scale found, 1913. Municipality has now undertaken to spray the places involved in all three outbreaks.

## ORANGE FREE STATE.

*Viljoens Drift.*—One outbreak on three properties; eighty-four trees being found infested, discovered at original inspection. Introduction, 1907. Outbreak burned out in 1912 by Division in co-operation with Vereeniging Estates Co. and Railway Department. No scale found, 1913.

*Kroonstad.*—Two outbreaks found at original inspection. One in Convent garden near town; 162 trees found infested in garden of 277 trees. Introduction, 1908 (?). About eighty infested trees destroyed and garden well sprayed, 1912. Scale checked and spraying continued, 1913. Municipal Council informed.

One outbreak in small garden on farm Dansfontein. Seven trees found infested. Introduction, 1907. Place neglected and scale not flourishing. Inefficient spraying, 1912. Conditions no worse, 1913.

## NATAL.

*Richmond.*—One outbreak in village discovered in 1911. Introduced in 1906, but evidently scale did not flourish. Infested and suspected trees burned in 1911, and no scale found later in 1912, when last inspected.

*Moorleigh.*—One outbreak in small garden on two farm properties; thirty-two infested trees found at general inspection. Introduction, 1906, but scale did not flourish until trees transplanted some years later. Known infested trees destroyed and remaining trees sprayed, 1912. Not visited, 1913.

*Hilton Road.*—One outbreak in country garden, apparently confined to two trees transplanted from Frere about a year before, discovered at general inspection. Known infested trees burned early in 1912. No scale detected, 1913.

*Pietermaritzburg*.—Two outbreaks. One in large nursery, apparently confined, when detected, to two spots a few feet square in apple stock bed and to eleven recently grafted apples. Introduction of scale conjectured to have been from oversea in 1905. Outbreak burned out December, 1911. No scale detected at any of several close inspections since made.

Second outbreak in two town gardens found at general inspection, when scale detected on forty-one trees. Introduction, 1908. All infested and suspected plants on principal property, and part of that on other, burned early in 1912 and remaining suspected vegetation sprayed. A very little scale found on the minor property and on two nearby properties, 1913. Municipal action now urged, but local nurserymen's association may privately arrange for destruction of all trees in infested gardens.

*Utrecht*.—One outbreak in town garden, eleven trees being found infested, discovered in general inspection. Introduction, 1907. Outbreak not visited, 1913, but municipal authorities urged to ensure that proper spraying done.

*Newcastle*.—A single year-old tree in town garden found slightly infested at general inspection. Tree burned and surrounding ones sprayed. Not visited, 1913. Occupier urged to watch and report if any scale appears and town authorities informed.

*Dundee*.—A single recently planted tree in town garden found infested with a single scale, possibly pernicious scale, at general inspection. Tree destroyed. No spread suspected and outbreak not since visited, but occupier urged to watch and report if any scale appears and Municipal Council informed.

*Frere*.—Extensive outbreak on eight properties in vicinity of country railway station discovered at general inspection. About 800 trees more or less infested—most very lightly, but some very badly. Origin doubtful. One place sprayed, probably ineffectively, 1912. Further inspection has disclosed pest on thirteen properties in all, and on one nearly two miles from station. About 1500 trees estimated to be infested. Satisfactory voluntary action improbable, but centre surrounded by open country. Railway Department has promised destruction of susceptible fruit trees on its property. Station Master cautioned against accepting plants for conveyance. Local hotel requested to post notice describing pest and urging action.

*Vryheid*.—Two outbreaks in town discovered at general inspection. One in small garden where four infested trees were found. Introduction, 1909. Eight trees burned and some others sprayed, 1912. Little live scale found on two trees, 1913.

Second outbreak on three properties, and about 150 trees found infested. Introduction, probably 1907. About seventy of known infested trees destroyed, and most remainder sprayed, 1912. Considerable live scale found, 1913, and municipal action recommended.

*Estcourt*.—Not visited in general inspection, but scale discovered in looking up suspected trees in October, 1912. Infestation widespread, and perhaps a thousand or more trees and majority of gardens in the village involved. Village small and surrounded by wide stretch open country. Chairman of Local Government Board, Magistrate, and Postmaster requested to post notice urging spraying, 1913.

# Effect of Dips on Wool.

## REPORT BY MR. MALLINSON.

The following report by Mr. Chas. Mallinson, Senior Sheep and Wool Expert, which has been submitted to the Minister of Agriculture, is published for general information. The report is, of course, the outcome of Mr. Mallinson's recent visit to Great Britain.

In accordance with your instructions I have endeavoured to ascertain if any (and, if so, what) serious prejudices or objections existed amongst English wool manufacturers against South African wool which had been dipped (in various dips) by the farmers of South Africa. Armed with a letter of introduction from Mr. Chiappini I called upon the Secretary of the Bradford Chamber of Commerce and was informed that the objections of his Chamber were embodied in the resolutions passed in 1908, which have been freely and repeatedly reported in the Press of South Africa.

I made application to be allowed to meet the Council of the Chamber to discuss the whole question, and in reply was invited to meet the Chairman and Secretary of the Chamber of Commerce and the Chairman of the Wool Section of the Council, who received me with kindly courtesy. I understand that the Chairman of the Chamber is not personally connected with the South African wool trade, but Mr. Richard Moore, of Bradford (the present Chairman of the Wool Committee), is largely interested in it, and he assured me that he could not remember a complaint having been received by his firm about South African wool which could be attributed to dipping. In spite of my repeated requests to be allowed to meet the Council and discuss the whole question with them no opportunity was afforded me of doing so.

I made careful inquiries as to who were the principal users of South African wool, and I called upon every firm whose name was given to me. In no case did I hear of any serious complaint about scouring, though some said occasionally sulphur was sufficiently in evidence as to necessitate greater care in scouring, but South American wools were much worse than South African in this respect.

In no case did I hear of any difficulty in dyeing, and during the whole course of my inquiry I have never had produced to me any single instance of any such difficulty ever having occurred, though I have everywhere asked for it. As will be gathered from the letter from Mr. T. H. Moore, wool dipped in caustic soda and sulphur or in lime and sulphur is alleged by the buyers to dye badly, but there is no ground for this allegation. As a matter of fact streaky dyeing may be due to faults in scouring, milling, dyeing, steam-blowing, or blueing; at the same time let it be thoroughly understood that caustic soda or the liquor from lime will do all the harm the Bradford Chamber of Commerce states if not used in proper quantities and well mixed. Flowers of sulphur is largely used as

a neutralizing agent; ground rock sulphur must *never* be used, as it is practically useless. (See Joseph Crossfield & Sons' letter.)

In some cases I got written evidence from large consumers bearing out what all told me, but I found many of them very chary about committing their opinions to writing. Extracts from some of the letters received are given at the end of this report.

I interviewed Mr. T. H. Moore, of Huddersfield, the head of a firm largely engaged as merchants in Colonial wools, whom Free State farmers will remember in connection with the lectures and demonstrations he gave them in 1905, and whose interest in South African wool improvement has been frequently in evidence ever since. It was on his advice that the Government of the day encouraged the extensive importations of Australian sheep, and throughout my inquiries I received abundant testimony from users of the extent of the consequent improvement in South African wool. Mr. Moore is the only man I met who has gone deeply and thoroughly into the question, and I consider his opinion of so much importance that I asked him to post it in writing so that I might embody it in this report. In the course of my frequent inquiries I received many introductions to users and frequent assistance from Mr. Moore and Mr. Lockwood, a large manufacturer, which I desire to gratefully acknowledge.

The Textile Department of the Leeds University and the Bradford Technical College rank amongst the very best institutions of their kind in the world. Amongst the students are young men from every country where woollen manufacturing is carried on, and the professors engaged are all thorough masters of both the theory and practice of woollen and worsted manufacturing, it being quite a usual thing for manufacturers to seek their opinions and advice upon difficulties encountered. I called upon Professor Beaumont, of the Leeds University, and his right-hand assistant, Mr. Hollis, also upon Professor Barker, of the Bradford Technical College, and discussed the subject with them. They very kindly undertook to conduct certain experiments upon fleeces with which I promised to supply them.

My advice to the farmers of South Africa is to keep on using the dips recommended by the Department of Agriculture, for it has been proved beyond all doubt that the lime and sulphur dip is one of the best eradicators of scab ever used. After all, our first care is to get rid of scab; it is not compulsory to use any dip in particular, but the farmer must get rid of scab in the shortest possible time.

Any one with any knowledge of sheep knows full well that any dip that will damage the wool to the extent complained of will also damage the skin of the sheep, more especially if the animal is not in good health, for at such times the skin is very tender, and farmers are not such fools either to dip their sheep in a sulphur-bed or a lime-kiln or even in a caustic soda bath.

On looking at the South African wool on show at the London wool sales in July I noticed amongst storekeepers repacked lots fleeces which bore traces of having been punished in the dipping either by the dip being too strong or not properly mixed. The tips of the staples had been scorched and rendered tender. I do not think that even in this case any trouble would result in dyeing, for the simple reason that in the process of manufacture these tender tips

would be ground almost to dust and disappear in the form of waste. But it means a reduced price for the wool to begin with and a consequent loss to the farmer. I cannot emphasize too strongly the necessity for great care on the part of the farmers to ensure that the dip is properly mixed with ingredients of the proper quality and standard. For instance, the sulphur must be *flowers* of sulphur, not rock sulphur, which is cheaper but quite ineffective for counteracting the injurious qualities of the soda, which is the main reason for mixing the sulphur in the dip.

The whole and sole reason why what appear to be lower prices are paid for South African wool than for Australian is in the greater amount of dust and consequent shrinkage in scouring of South African wool as compared with Australian. I carefully watched the London wool sales and am satisfied that the prices paid for South African wool were quite as good as those paid for Australian of the same length and quality after taking the condition into account. Time after time I was told that we need to grow longer wool and to send less dust with it; in one or two cases the wool appeared as if the sheep had been shorn when the wool on their backs was not quite dry, and the skirting was not done as well as it might have been; also long and short wool packed together in the same bale. All these things will have to be remedied before we get into line with Australia.

I cannot conclude this report without expressing my great indebtedness to every one from whom I sought information or assistance for the unfailing courtesy with which I was received and for the readiness with which my requests were complied with. Everywhere I met with the deepest interest in what was admitted was as much to the advantage of the user as to the producer. The world's demand for wool is increasing faster than the world's supply, and consumers are looking to South Africa to make great strides and to send more and better wool. I am convinced that we need have no fear our supplies will be neglected. We can at all times rely upon receiving what our wool is worth, and our aim must be to make it worth more.

It may interest the Department to learn that the whole of my life has been spent amongst sheep and wool, and that the information contained in this report was at my disposal before I left South Africa last May. From bitter experience I have learned all there is at present to be known regarding sheep and wool, and my most costly venture was an inquiry into dips and dipping material. Notwithstanding these facts I inquired into the recent controversy and obtained written expressions of opinions from the persons best qualified to judge and whose views will carry conviction to all responsible persons, in the hope that this was what the Department required. In any case, however, my visit was not wasted, for I made it my business to acquaint the users of South African wool with our conditions, and they will, I am sure, in future adopt a more sympathetic attitude.

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## ANNEXURES.

One large wool manufactory near Huddersfield reports:—

We have used many thousands of bales of South African wool; over a thousand bales during the last six months. We have never experienced any difficulty in scouring the wool

a good colour. We find that, although South African wool is credited as being as well serrated as Australian, it does not spin so well and does not mill or felt so well as Australian, the reason being that the fibres do not adhere to each other with the same tenacity. We find South African wool not so sound as Australian, and consequently it requires more twist in the thread. We have noticed some improvement with regard to these defects in recent years.

A top maker and merchant at Bradford states:—

I use about five thousand bales of Cape wool per annum and could do with two or three times that quantity if it were longer in the staple and better classed. I have no complaint to make about either dips or anything else, nor have I ever received any complaint from my customers about either defective dyeing or anything else which could be traced to the wool. The only difficulty I have ever experienced in scouring has been occasionally a suspicion of sulphur in the wool which has necessitated making the scour a little stronger. This is a defect which is much more common in wool from South America than from the Cape. and it is not an insuperable objection, though of course we don't like it. Wouldn't dipping earlier or shearing later remedy it?

About three hundred bales of good combing wool were offered in London for which the owner expected to get 10d., but only 7½d. was bid. The brokers pointed out to the owner the excessive amount of dust and consequent shrinkage was the reason for the low bid. The owner determined to test the lot for himself, and following is the result of a test of a sample bale selected by the owner and combed by Messrs. Isaac Holden & Sons:—

| | | | | | | |
|---|---|---|---|---|---|---|
| Top ... ... | 25·10 % | 92 lb. @ 2s. 5d. | £11 | 2 | 4 |
| Noils ... ... | 4·63 % | 17 lb. @ 1s. 4½d. | 1 | 3 | 4½ |
| Robbings ... | ·81 % | 3 lb. @ 1s. 4½d. | 0 | 4 | 1½ |
| Shoddy ... | 1·62 % | 6 lb. @ 2½d. | 0 | 1 | 3 |
| Burrs ... ... | ·27 % | 1 lb. @ 2d. | 0 | 0 | 2 |
| Evaporation ... | 67·57 % | 248 lb. | | — | |
| | 100·00 % | 367 lb. | £12 | 11 | 3 |

| | | | |
|---|---|---|---|
| The net weight of the bale was 378 lb., which at 7½d. = | £11 | 16 | 3 |
| Britch and locks sorted out, 11 lb. @ 5d = | 0 | 4 | 7 |
| | £11 | 11 | 8 |
| The cost of combing, which is reckoned on the top only, 92 lb. @ 2½d. = | 0 | 19 | 2 |
| | £12 | 10 | 10 |

*Copy of letter from Messrs. Joseph Crosfield & Sons, Ltd., Warington, to Mr. Chas. Mallinson, dated 29th July, 1913.*

Dear Mr. Mallinson,

*Sulphur and Caustic Soda Sheep Dip.*

We beg to confirm the conversation we had with you when we had the pleasure of seeing you recently at our works with regard to the correspondence which has appeared in various farming and other journals, and which has shown that there is a great deal of misconception with regard to the above sheep dip, which is undoubtedly the most efficient scab dip on the market.

It has been contended by certain correspondents that the caustic soda in this dip has a damaging effect upon the wool, but the composition of the dipping fluid, as prescribed by the South African Government, is such that when the directions given for mixing are properly

followed out, there is no free caustic left in the solution, as this is entirely neutralized by the large excess of sulphur with which it is mixed. In making this statement we would particularly emphasize the necessity of carrying out the South African Government's instructions implicity, making certain the *flowers* of sulphur have been employed.

We have ourselves printed a circular dealing with this preparation, and also particularly mentioning *flowers* of sulphur. It is quite frequently asserted that ground rock sulphur (which is considerably cheaper) is a satisfactory substitute for flowers of sulphur, but under the conditions in which the dip is prepared we contend that it is practically useless, as it does not neutralize the caustic, and consequently the necessity for using finely divided flowers of sulphur cannot be too strongly insisted upon. The Government has already adopted a standard quality of caustic soda, and has all along specified this, but the possibility of the variation in the quality of the sulphur appears to have been overlooked, and it is more than possible that the cause of some unsatisfactory results, which doubtless have been honestly quoted, can be traced to the nature of the sulphur employed.

There can be no doubt that a mixture of caustic soda and sulphur, in which the proper quantities have *not* been employed, and in which inferior articles have been used, so that the caustic soda has not been completely "killed" by the sulphur, is an unsatisfactory mixture in which to dip sheep, and will be liable to both damage the wool and injure the sheep, but this contingency can never arise when the sulphur is that specified by the South African Government, and when the directions for mixing are properly followed.

To the lay mind the word caustic and the words caustic soda are liable to be altogether misunderstood, and to be considered dangerous, and this chemical would naturally be so were it not neutralized. All soluble arsenic dips contain soda in combination with the arsenic, and though caustic soda may have been and almost invariably is used to dissolve the otherwise insoluble arsenic trioxide, no one thinks of this combined soda as having retained its "caustic" character, and no more should it be thought that the soda which exists in a properly prepared sulphur dip is still "caustic" in its properties.

Yours faithfully,

(Signed) C. HASLAM.

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*Copy of letter from Mr. T. H. Moore, Huddersfield, to Mr. Chas. Mallinson, dated 21st June, 1913.*

Dear Sir,—You ask me to put into writing the reasons which induced me in 1907 to report to the Free State Government that they might safely recommend the farmers to use the soda and sulphur dip without any fear of injury to the wool. I have already had the pleasure of discussing this subject with you at considerable length and in much detail, but I agree that it will be better to once again put my views of the whole question upon record.

When in South Africa in 1905, I, along with Mr. Palmer, attended twenty-six conferences with the farmers, and discussed wool subjects in every town of the Free State. Everywhere I was questioned about soda and sulphur as a dip, and was very cautions in my replies. Like

the wiseacres of the Bradford Chamber of Commerce I knew that a strong solution of soda would dissolve wool, and I imparted this valuable information to the farmers, who laughed at me and showed me sheep and fleeces which had been dipped and in which I failed to discover any ill-effects whatever. Finally Mr. Palmer showed me at the Government farm sheep which had been dipped in soda and sulphur, some one month, some another, covering nearly every month of the year. This was in October, when the wool was approaching full growth.

On the earlier dipped sheep I failed to find any indication whatever, and could not possibly pick out sheep which had been dipped from amongst others which had not. Subject to tests to be made at home I then formed the opinion that if the sheep were dipped shortly after shearing, or say any time up to within three months, no injury would be detected in the wool when shorn nine or eleven months later. Exposure to sun and weather in the interval would remove any traces of either soda or sulphur in the wool. The result of many hundreds of experiments since then, not only with samples but with bulk, has only tended to confirm this common sense view, which was the one taken by the farmers themselves from the outset. A healthy sheep naturally grows healthy wool. Give the sheep a chance by killing the scab upon it, and trust nature to do the rest. The farmers knew what they were doing.

Mr. Palmer sent me the fleeces from the sheep which I had seen at Groot Vlei, and I also received many others from farmers all over the Free State with whom I had discussed the subject, but the experiments made with them only confirmed the opinion expressed above.

In order to test exactly what would be the worst that could possibly happen if sheep were dipped shortly before shearing instead of shortly after, I had a quantity of dip prepared according to the Government formula:

5 lb. of caustic soda;
20 lb. flowers of sulphur;
100 gallons of water;

and with it experiments were made by my late son, Brian, in conjunction with the staff at the Huddersfield Technical College. The sudden death of my son somewhat curtailed the number of the tests we set out to make, but the tabulated details left by him of the 400 experiments made enabled me to compile the following report to Mr. Palmer under date 5th September, 1907:—

1. Dyeing.—Samples of yarn made from Orange River Colony wool were immersed in the cold dip and allowed to become thoroughly saturated. They were then dried in the sun and dyed various colours, in each case along with another sample of the same yarn which had not been dipped. The various samples are sent you herewith. The dip gives the yarn increased attraction for dye stuffs, which, of course, is an advantage. A sample of greasy wool which was immersed in the dip, sun dried, then scoured and dyed, showed the same increased affinity for colouring matter. Repeated dipping emphasized the advantage.

2. Elasticity.—The test of yarn for elasticity gave better results for the dipped than the undipped samples. This, I think, was due to the fact that the dipping caused a slight shrinkage in the fibre.

Individual fibres of wool and five fibres twisted together ($4\frac{3}{4}$ turns per inch) gave an opposite result, indicating a loss of elasticity of about 8 per cent.

3. The yarn samples showed a decrease in strength varying from 3 to 7 per cent. Individual fibres of wool and five fibres twisted together gave even greater decreases, varying from $17\frac{1}{2}$ to 20 per cent.

4. Weight.—Bearing in mind that a strong solution of caustic soda will dissolve wool entirely, I had several experiments made with immersions varying from one minute to one hour, sun dried and weighed as soon as dry, and reweighed after the lapse of a week, and again a month later. Contrary to expectation, I found in every case an actual increase in weight. This varied from 4 per cent. to 7 per cent. after one minute's immersion (sun dried), to 7 per cent. after one hour's immersion. A week's exposure to the sun and atmosphere reduced again in weight about 1 per cent. A month later showed no further loss.

5. Summary.—It must be borne in mind that these experiments were made with perfectly clean wool which had not the protection of the natural grease to withstand the action of the chemicals. I am of opinion that the shrinkage in elasticity and strength is of such a nature that it would not operate at all on the fleece of a live sheep. Whatever diminution in this respect which might be discovered immediately after dipping would disappear as soon as the grease had an opportunity to rise into the staple say in a week or two's time, therefore, in every respect the action of the dip is satisfactory. It assists the scourer and the dyer; it does not detract from spinning properties, and it helps the farmer by giving him increased weight of clean wool.

The greatest object of all, the eradication of scab, is so well understood by the farmers that I need not enlarge on that.

It will be noticed that one effect of the dip upon perfectly clean wool dyed immediately after, was to give it an increased attraction for dyewares. Upon this fact rests the whole of the elaborate fabric of objections raised by one or two individuals under the protecting wing of the Bradford Chamber of Commerce. The custom in Bradford is for most manufacturers to send their pieces out to dyers to dye and finish. Dyeing is a most delicate operation, in which it is very easy to make a mistake. As one versed in the practical work of manufacturing, you know perfectly well that "streaky" or irregularly dyed cloth may be caused by quite a number of causes apart from the wool. When a defective finished piece of cloth comes forward a battle royal ensues between dyer and manufacturer as to the cause of the fault. The manufacturer says it is the dyer's fault, and he must stand to the loss. The dyer says it is the wool which is wrong, or the spinner has put too much or too little twist in the yarn. Each one tries to save his own skin (or pocket) at the expense of the other. Certain well-meaning gentlemen who write for newspapers and who are always on the lookout for a subject which will "catch on" at once begun to elaborate the possibilities of all "streaky" pieces being caused by mixing wool which had been dipped in soda and sulphur with wool which had not. The dyers were delighted with this new excuse. The manufacturers knew it was absurd, and not one of them who bought South African or South American wool has discontinued doing so in consequence of the vapourings of the newspaper man. Because a certain dip has a certain effect upon clean wool when dyed a few

minutes after dipping, it is too much of a strain upon ordinary intelligence to assume that the same effect will result upon wool which was only a quarter grown when dipped on the live animal nine months before, and afterwards exposed to such a sun and such storms as we know nothing of in this country.

Any dip which will permanently injure the wool will, I contend, also destroy the constitution of the sheep. The farmer is the best judge as to avoiding this. I say let them dip in the dip which is most effective for giving him a healthy flock, and he need not have any fear about losing the market for his wool.

Yours truly,

(Signed) T. H. MOORE.

# Rural Notes.

*** *As we go to press, Dr. Macdonald has returned to South Africa and has tendered to the Government his resignation of his post as Editor of the* Journal. *Mr. Jos. Burtt-Davy, the Government Agrostologist and Botanist, too, is back in South Africa, and has also resigned. A reference to the official careers of these two gentlemen will appear in our next issue.*

**The Position of East Coast Fever.**

In the course of the third day's proceedings of the congress of the South African Agricultural Union at Durban, to which reference is made in our Editorial Notes in this issue, an interesting statement was made by Mr. Gray, the Chief Veterinary Surgeon to the Union, with reference to the present position in regard to East Coast fever. There was an idea, said Mr. Gray, that there had been laxity in his Department regarding the administration of East Coast fever regulations, and he was therefore glad of an opportunity to show how things stood. Things were going very well indeed in the Transvaal, where there was very little fever; even the Zoutpansberg District, which had been the worst place of all, was now almost free from infection. So far as the Cape was concerned considerable difficulty had been experienced with regard to the outbreaks at East London, owing to the lack of legal provisions which could enable them to make and enforce regulations. They had changed that state of things, and just now were preaching dipping everywhere. A dipping campaign had been carried out in the Kingwilliamstown native districts, and the disease might be said to be at a standstill. Regarding the Transkei, those present would appreciate the difficulty experienced in fighting

the disease in a country which was practically wholly a continuous grazing area. The natives had done their best and had subscribed money themselves for the erection of dipping tanks, but it had been practically impossible to get all the cattle dipped in the enormous area of the Transkei. They had then tried inoculation, and with the whole of their staff at work 192,000 head of cattle had been inoculated. He was not personally in favour of inoculation, as the mortality was very high, but they saved at least 40 per cent., which, however, was all that could be done to save the only means of transport in the country.

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Regarding Natal, the inspectors had been instructed to pay the greatest attention to the strength of the dips, and they did this. In cases in which cattle seemed to have been improperly dipped samples of the dips used were sent to the Department, and steps were being taken to serve notices on all absentee owners of infected farms in Natal requiring them to erect dipping tanks on their property. Magistrates had been instructed to serve the ~~notices~~, if they had not already done so. In one district—Ladysmith—it has ~~been found~~ that no fewer than sixty-six farms belonging to absentee owners were with a notice. As regards Crown lands, the Government would discharge its obligations by erecting dipping tanks, and dipping tanks were being erected also on native locations. There would be difficulty in connection with Zululand, but it was being overcome, and the tendency of all the work was to push the disease to a corner and stamp it out. Natal's position was steadily improving, and, while they might have set backs, there was no doubt that the mortality had been diminished greatly. The chief need, however, was constant vigilance. The best proof that the position in Natal was better than heretofore was that there was restocking of farms in all parts. Over 2000 tanks had been erected. Immediate results, so far as appearances went, must not be looked for, but they could take it that the position in Natal had improved and was steadily improving. None would be more pleased than he to see compulsory dipping throughout the Union. But in order to make it a success it must have unanimous co-operation on the part of all. His personal opinion was that dipping should be universally compulsory, but that without co-operation on the part of all concerned the measure would lose its value. They could not enforce a regulation upon people if they were actively against it.

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**This Season's Maize Grades.**

So far as the maize crop is concerned the real economic effects of the severe drought of last year are now beginning to be felt. The result of the dry season and the early frosts has been a crop of very low average quality—so poor indeed that anything like the dimensions of export trade in previous years cannot be expected this season. The situation created has been this, that, with the ordinary standards of grading prescribed for previous seasons in operation, the export trade would have been very seriously diminished, with the necessary accompaniment of an undue flooding of the local markets. Representations were made to the Department of Agriculture in the matter, and it was decided to call a meeting (which took place at Kimberley on the 13th ultimo), and there is was resolved to adopt a lower

standard of grading for this season's maize. A list of the grades adopted is given below, operating as from the 23rd September and until further notice:—

| *Grade Mark to be shown on bags.* | *Class.* | *Description.* |
|---|---|---|
| 1 | F.W. 1 | To be sound, dry, plump, and well cleaned, with a maximum of 3 per cent. of yellow, discoloured, or defective grain. |
| 2 | F.W. 2 | To be sound, dry, and reasonably cleaned, and not containing more than 8 per cent. of defective grain and 5 per cent. of other coloured grain. |
| 3 | F.W. 3 | To be sound, dry, and reasonably cleaned, and not containing more than 13 per cent. of defective grain and 5 per cent. of other coloured grain. Berries may be of irregular size and shape. |
| 4 | F.Y. | To be sound, dry, and reasonably cleaned, and not containing more than 9 per cent. of defective grain and 5 per cent. of other coloured grain. Berries may be of irregular size. |
| 5 | R.W. | To be sound, dry, and reasonably cleaned, and not containing more than 9 per cent of defective grain and 5 per cent. of other coloured grain. Berries may be of irregular size. |
| 6 | R.Y. | To be sound, dry, and reasonably cleaned, and not containing more than 9 per cent. of defective grain and 5 per cent. of other coloured grain. Berries may be of irregular size. |
| 7 | F.M. | To be sound, dry, and reasonably cleaned, and not containing more than 10 per cent. of defective grain. |
| 8 | R.M. | To be sound, dry, and reasonably cleaned, and not containing more than 10 per cent. of defective grain. |
| 9 | No grade. | To include all maize which cannot be classed in a higher grade, but in dry condition and fit for shipment. |

The Kaffir corn and jiba grades decided upon are as follows:—

KAFFIR CORN GRADES.

| *Grade Mark to be shown on bags.* | *Class.* | *Description.* |
|---|---|---|
| K. 1 | White | To be sound, reasonably clean, and not to contain more than 5 per cent of coloured grain. |
| K. 2 | Pink | To be sound, reasonably clean, and not to contain more than 10 per cent. of white grain. |
| K. 3 | Mixed | To include any other sweet kaffir corn (excluding jiba or jhiba) which cannot be classed under pink or white, provided it is sound and reasonably clean. |
| K. 4 | No grade | To include all kaffir corn in dry condition fit for export (including smutty) which cannot be classed in a higher grade. |

JIBA GRADE.

| | | |
|---|---|---|
| J. | Jiba or Jhiba | To include the variety known as jiba, in sound condition and reasonably clean. |

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**Caustic Soda and Sulphur Dip.**

Mr. F. P. Fincham, Senior Inspector of Sheep, Cape Province, writes:—"My attention has been drawn to a letter in *The Farmers' Weekly* in which I am given credit for certain remarks about the use of caustic soda and sulphur, said to be contained in a paper read by me before the Queenstown Farmers' Association. The following facts will, I think, show that this statement was not only incomplete but most unfair to a dip which has helped in a large measure to eradicate scab in the flocks in this country. It was also very misleading to the public, as it was certainly not my intention to assert that caustic soda

and sulphur was not an effective cure for scab. What I did try to show was that, like all other dips, it would not destroy the eggs, and a *second* dipping was therefore necessary to complete a cure of the disease. (1) In the paper read before the Queenstown Farmers' Association no mention was made of caustic soda and sulphur, or any other dips, except in the following way:—

> Practical experience has proved that these acari increase very rapidly, and are egg-bearing little creatures *All* dips have little or no effect upon these unhatched eggs, hence the necessity for a second dipping within from ten to fourteen days, to destroy the acari hatched out subsequent to the first dipping.

(2) In the discussion which followed (of which a brief report was given) a farmer stated that he had been informed that arsenite of soda would kill the eggs, and that *one* dipping would therefore be quite sufficient, and asked me if this were so. In reply, I stated that I had no experience with arsenite of soda, but that—owing to the fact that certain farmers in one of my districts had stated that *one* dipping with caustic soda and sulphur would both kill the insect and destroy the eggs—I had 1200 sheep (not 12,000 as ~~reported~~) dipped, under capable supervision, in a strong solution of caustic soda ~~and sulphur~~ as a test. But after twenty-two days newly hatched insects, ranging from about five days to two weeks old, were found.

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**Lands for Disposal.**

Applications will be received at the Department of Lands, Pretoria, for a period of ten weeks from the 5th September, and for such time thereafter as the holdings or any of them remain unallotted, for the farms mentioned in the accompanying list, to be disposed of on lease for a period of five years, with the option of acquiring the land at any time during the currency of the lease, or at the expiration thereof, on terms of Conditional Purchase Lease extending over a period of twenty years, under and subject to the provisions of the Land Settlement Act, No. 12 of 1912, and any regulations published thereunder. A clause will be inserted in the leases which it is proposed to issue in respect of those farms on which boreholes have been sunk giving the Government access to and the right to take water from the borehole for drilling purposes for a period of five years from the date of the lease. Should any of the above holdings be allotted to a partnership, it will be a condition of allotment and of the lease that all the partners must reside on the land for a period of at least eight months in each year. The successful applicant for any of the above farms on which boreholes have been sunk will be required to satisfy the Department that he has immediately available suitable machinery for raising water from the borehole, and to give an assurance that he will not raise water without such machinery. The lease to be issued will contain conditions relative to residence, improvements, fencing, and such other conditions as are usually inserted in agricultural leases granted under the Land Settlement Act, No. 12 of 1912. The rent paid during the lease period of five years is not deducted from the purchase price in the event of the option to purchase being exercised. All rights to minerals, mineral products, mineral oils, metals, and precious stones are reserved to the Crown. All applications must be submitted on the prescribed forms, which, together with copies of the

## LANDS FOR DISPOSAL.

| Holding Number. | Registered Name and Number. | Area. | | Purchase Price. | Rental during lease period of 5 years. 1st Year, nil. | | If option of conditional purchase be exercised—Half-yearly Instalment, which includes Capital and Interest at 4 per cent. spread over 20 years. | Approximate area of. | | Nearest Railway Station. | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Morgen. | Sq. Roods. | | 2nd and 3rd years, 2 per cent. per annum. Half-yearly Rental. | 4th and 5th years, 3½ per cent. per annum. Half-yearly Rental. | | Pastoral Land. | Arable Land. | | Miles. |
| | **LYDENBURG.** | | | | | | | | | | |
| | | | | £ s. d. | £ s. d. | £ s. d. | £ s. d. | | | | |
| 1 | Portion "A" of the farm Steelpoortpark No. 1076 | 1912 | 10 | 674 10 0 | 6 14 11 | 11 16 2 | 24 13 2 | 1912 | | Lydenburg | 50 |
| 2 | Portion "E" of the farm Steelpoortpark No. 1076 | 2266 | 266 | 767 17 0 | 7 13 7 | 13 8 9 | 28 1 5 | 2266 | Patches | " | 50 |
| 3 | Portion "F" of the farm Steelpoortpark No. 1076 | 1967 | 66 | 666 10 0 | 6 13 4 | 11 13 4 | 24 7 3 | 1967 | Patches | " | 50 |
| | **RUSTENBURG.** | | | | | | | | | | |
| 4 | Tusschenkomst No. 188 ... ... ... | 1601 | 576 | 822 2 0 | 8 4 5 | 14 7 9 | 30 1 1 | 1601 | | Rustenburg | 85 |
| 5 | Application No. 934 ... ... ... | 1820 | 281 | 932 5 0 | 9 6 5 | 16 6 3 | 34 1 7 | 1790 | 30 | " | 75 |
| | **WATERBERG.** | | | | | | | | | | |
| 6 | Karriebosch Drift No. 1057 ... ... | 2113 | 528 | 293 4 0 | 2 18 8 | 5 2 8 | 10 14 4 | 2113 | | Potgietersrust | 130 |
| 7 | *Madamefontein No. 943* ... ... ... | 1901 | 531 | 360 18 0 | 3 12 2 | 6 6 4 | 13 3 10 | 1901 | 1000 | " | 45 |
| 8 | Slangkuil No. 17 ... ... ... ... | 1518 | 520 | 402 10 0 | 4 0 6 | 7 0 11 | 14 14 3 | 1518 | | Nylstroom | 56 |
| | **ZOUTPANSBERG.** | | | | | | | | | | |
| 9 | De Put No. 1979 and Uitval No. 1890 ... | 606 | 178 | 321 15 0 | 3 4 4 | 5 12 8 | 11 15 3 | 606 | | Pietersburg | 16 |
| 10 | Eersterechter No. 1776 ... ... ... | 791 | 373 | 524 9 0 | 5 4 11 | 9 3 7 | 19 3 5 | 198 | 593 | " | 26 |
| 11 | Kwaggasbult No. 1857 ... ... ... | 713 | 214 | 462 4 0 | 4 12 5 | 8 1 9 | 16 17 11 | 500 | 213 | " | 36 |

regulations framed under the Act, can be obtained from the Magistrates of the districts in which the farms are situate, or from the Secretary for Lands, Pretoria.

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The Lands Department offer the following observations on the various holdings:—(1) Suitable for agricultural and stock farming; fairly well wooded; watered by the Steelpoort River and a small spruit; malarious in summer; natives living on the land. The farm is accessible by wagon by the main road from Lydenburg to Magnet Heights. An amount of £27. 6s. 2d. has been added to the valuation of this holding in respect of the fencing of the boundary line adjoining the farm Belvedere No. 1344. (2 and 3) Suitable for agricultural and stock farming; fairly well wooded; there are small springs on the holdings; fairly healthy; natives living in the vicinity. The holdings, which can be reached by wagon from Klein Nooitgedacht, are well suited for grazing sheep in the winter time. (4) Suitable for agricultural and stock farming; sparsely wooded; slightly malarious in bad seasons; natives living in the vicinity. There is a borehole on the holding giving an estimated daily water supply of 34,000 gallons. (5) Suitable for agricultural and stock farming; some thorn trees; fairly healthy; natives living in the vicinity. There is a borehole on the holding giving an estimated daily water supply of 16,000 gallons. (4, 5) These farms are situate within the Game Reserve. (6) Suitable for agricultural and stock farming; sparsely wooded; no permanent surface water; malarious; natives in the vicinity. (7) Suitable for mixed farming; some bush; no permanent surface water; malarious; native labour scarce. (8) Suitable for stock farming; small extent arable; sparsely wooded; no surface water; healthy; natives living in the vicinity. (9) Suitable for agricultural and stock farming; fairly well wooded; there is a small spring on Uitval, not permanent; healthy; natives living on the land and in adjoining Matietzie's Location. An amount of £52. 12s. 9d. has been added to the valuation of the holding in respect of the cost of fencing a portion of the boundary. (10) Suitable for mixed farming; fairly well wooded; considered healthy; not far distant from a native location; good stock farm. There is a borehole on the holding giving an estimated daily water supply of 32,160 gallons. (11) Suitable for agricultural and stock farming; fairly well wooded; considered healthy; fair rainfall; natives living on the land. There is a borehole on the holding giving an estimated daily water supply of 57,600 gallons.

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**Cradock Field Trials.**

As stated in the Editorial Notes in this issue, the Cradock Agricultural Society is offering two prizes of £12. 10s. each for a light and a heavy plough suitable for furrowing. The trial will take place in connection with the next agricultural show, and the conditions of entry are as follows:—(1) Entries must reach the Secretary, at Fish River Station, Cape Province, by the 10th February, 1914, accompanied by an entrance fee of one guinea for each implement. (2) A declaration of the selling price (at the exhibitor's place of business) must accompany the entry, such declaration to be attested by a Justice of the Peace. (3) A drawing, illustration, or photo of the implement

must be sent at the same time. Late entries will be received up to the day previous to the trial on payment of a fee and a half. (4) Implements for the competition must be sent carriage paid, addressed to the Secretary, the Field Trial Section, Cradock, and must bear the name and full address of the sender. (5) The ordinary rules and show regulations of the society will apply to this section in so far as they do not conflict with these special ones. (6) The society will not be responsible for the safety of the implements, but will take ordinary care of them. The society will provide such teams and drivers as the judges may direct. It is desirable that each exhibitor have some one in charge of his exhibit to show it off to best advantage. The Secretary is Mr. Geo. H. Byrnes, Fish River Station, Cape Province.

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**Irrigation Association.**

The Third Annual Congress of the South African Association will open on Tuesday, 11th November, at 11 a.m., in the Town Hall, Garaff-Reinet, and sit during the ensuing three days. The President (Sir T. W. Smartt, M.L.A.) is absent in England, but is expected back in time to take the chair. A programme teeming with interest is being prepared, the business including the discussion of a scheme by which it is proposed that the association shall offer a prize of £100 for the best practical and commercial results to be obtained from a given area of irrigated land (say ten morgen) within a given period (say one complete season). Papers are being prepared on such interesting subjects as "Some Conditions which Affect Soil Fertility," by Dr. Juritz, the Chief Analyst; on "Land Drainage and Irrigation with Special Reference to the Problem of Brak," by Mr. J. P. Marais, of Wonderfontein, Robertson, whose remarkable success in dealing with these problems on his farm is well known; on "Closer Settlement under Irrigation," by Mr. A. E. Mills, of the Grootfontein School of Agriculture; on "Irrigation by Zaaidams, as practised in the Arid North-West of the Cape," by Mr. Carel van Zyl, of Carnarvon, and others, the details of which have not yet been received. In addition to the above, members and visitors will be afforded full opportunities of seeing for themselves, under capable guidance, some of the more important irrigation and soil reclamation work which has been carried out by private enterprise in the District of Graaff-Reinet. At least two afternoons will be devoted to visiting farms like that of Mr. Walter Rugidge, "Dalham," and that of Mr. G. Olivier, or others of a similar character. On the Friday afternoon the whole congress is invited by the Principal to visit the Grootfontein Agricultural College at Middelburg (Cape). This being a typical Karoo farm of great extent contains many features of attraction to practical irrigators, including the much-discussed Barbary ostriches. The College and its surroundings, with the unique fountain and flood irrigation schemes, are well worth a visit. The association is always pleased to welcome visitors to its congresses, and as the Railway Department is announcing excursion fares at single charge for the double journey from all stations from 1st November, the usual concession certificate is unnecessary. Those who intend to go to the congress can obtain full particulars from the secretary, Mr. F. D. MacDermott, P.O. Weenen, including information as to accommodation during the sitting of congress.

**Foot-and-Mouth Disease in Great Britain.**

We have received a copy of a memorandum issued by the British Board of Agriculture and Fisheries on the outbreak of foot-and-mouth disease in Great Britain and certain other countries during the year 1912, which furnishes interesting reading. The document opens with a "narrative account of the epidemic," from which we learn that Great Britain had been completely free from foot-and-mouth disease for more than six months when, on the 23rd June, 1912, a telegram was received by the Board of Agriculture reporting a suspected outbreak of the disease on the farm Bellmount, situated two miles from Penrith, involving six cows. Every possible precaution was taken to prevent the spread of the disease. By the following day sixteen cows showed typical symptoms of foot-and-mouth disease, and these were slaughtered as well as all other animals that had been in recent contact with them. An Order under the Diseases of Animals Acts was immediately issued prohibiting the movement of animals in a wide area of country—approximately thirty miles in diameter—around the infected place. There was no clue to the origin of the infection; and it was deemed advisable to send a warning telegram to every local authority (330 in all) throughout the country. On the 27th June two veterinary inspectors at Liverpool reported that they had seen lesions of suspected foot-and-mouth disease in the tongues and feet of bullocks slaughtered the day before in the abattoir. These animals had come from Ireland and had been exposed for sale, along with some 1100 other cattle and 9000 sheep, in Stanley Market, Liverpool, on Monday, the 24th June. Stanley Market is a great distributing centre for cattle and sheep, especially those imported from Ireland, and by Thursday the animals exposed in the market on Monday had been dispersed in all directions. Inquiries proved that the diseased bullocks had been part of a consignment of 62 cattle and 168 sheep shipped on the 22nd June by a well-known Dublin dealer; and an order was accordingly issued prohibiting the landing of any Irish animals in Great Britain. Inspectors were told off to trace to their respective destinations all the 60,000 animals which had recently been landed in Great Britain from Ireland. During the next three days the disease was traced to new centres in the West Riding of Yorkshire and to two farms within a few miles of Morpeth.

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The outlook was grave, for it was clear that the germs of the disease had been scattered over a wide area; it was impossible at that moment to see where it would end; but the Board hoped that by unremitting energy and the imposition of rigorous restrictions, whenever a new outbreak was reported the disease could be isolated, and prevented from spreading into the surrounding district. The great annual show of the Royal Agricultural Society of England was fixed for the week beginning the 30th June at Doncaster in Yorkshire. On the eve of the show the Board felt themselves obliged to prohibit the exhibition of cattle, sheep, goats, and swine; those which had already arrived were sent back after veterinary examination to the places whence they came, there to be kept under careful observation. One lot of Irish animals arrived at the show-ground, and these had to be immediately slaughtered. During the last days of June, and

up to the 3rd July, 32 suspected outbreaks had been reported, of which 22 in Cumberland, Lancashire, Cheshire, Yorkshire, Northumberland, and Durham were confirmed—all directly traceable to Ireland. All affected animals and those which had been in recent contact with them were immediately slaughtered, and orders were issued absolutely prohibiting any movement of animals within about fifteen miles of each outbreak. In some districts also, e.g. in Northumberland, where the disease appeared to have obtained a firm hold, restrictions were imposed upon the holding of markets even outside the scheduled areas. In another week the number of confirmed outbreaks had risen to 42, for the most part in Northumberland, but some few also in Lancashire and Yorkshire. At this time, viz., about the 10th July, there was a band of country, thirty miles wide at the narrowest point, stretching from Liverpool on the west to Hull on the east, in which no animal could be moved from one field into another on the opposite side of the road without a special licence, which was granted only in exceptional cases and safeguarded by every imaginable precaution. Not only the inspectors of the Board and the local authorities, but the whole police force in the scheduled areas watched night and day to see that their restrictions were not evaded. These drastic measures soon began to show good results; the epidemic still spread, but not with the same alarming rapidity as at first, and by degrees the authorities got the upper hand. By the end of July 59 outbreaks had been confirmed, by the end of August 70, by the end of September 81. One more case occurred on the 8th October in Northumberland, and one nearly two months later, on the 1st December, in Kent, the latter apparently not connected in any way with the earlier outbreaks. There has been no case at all since the 1st December, 1912. The animals slaughtered during the epidemic numbered 3094 cattle, 6395 sheep, 891 swine, and 5 goats; and the net amount paid in compensation was £38,628. The whole of Scotland and 46 out of the 62 counties of England and Wales were kept entirely free from the disease.

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### A New Book on Ostriches.

OSTRICH FEEDS AND FEEDING, by W. G. Dowsley, B.A., R.U.I., Master-in-Charge, Agricultural Department, St. Andrew's College, Grahamstown; and Charles Gardner, President, Alexandria Farmers' Association; President, Upper Albany Farmers' Association; Chairman, Ostrich Feather Standarization Congress, Cape Colony, 1909; Chairman, Ostrich Investigation Committee, U.A.F.A., 1905-07. (Grahamstown: The Publishers, P.O. Box 118. Price 15s.)

The literature of ostrich farming in South Africa cannot be described as an extensive one, if we reckon it in volumes. Many a practical article has appeared from time to time in the South African Press, from the pen of experienced breeders, but the ephemeral and generally limited nature of their publication has precluded the fullest value being derived from them and has resulted in their being practically lost to the world. Messrs. Dowsley and Gardner, however, have presented us with something more lasting, a practical volume that cannot fail to be of benefit to the great majority of ostrich breeders all over South Africa. The authors, in producing this book, have attempted something new in the literature of ostrich farming. Whilst the management of ostriches naturally comes in for some share of attention, it is to the theoretical and practical sides of the problem of feeding that they have mainly directed their studies, and the

result is a practical volume. Glancing first at the scope of the work we find chapters on "breeding birds," "the chick," "the plucking bird," "the sick bird," "food," "bone," "lucerne and other leguminous foods," "other foods," and "foodstuffs and their effects"; whilst there are tables dealing with the analysis and relative values of various foods. The food requirements of birds at their various stages and in various conditions are carefully studied, and the recommendations made are eminently practical. There is one feature of the book that will appeal to the busy farmer, and that is the concise manner in which the various points discussed are dealt with. There is no unnecessary verbiage, yet this rule has not been followed at the expense of lucidity—indeed, the arguments which are brought forward are plainly and directly discussed, and they impress the reader the more because they are always to the point. On the other hand, the book would have been improved by the breaking up of the chapters with sub-headings. This would have rendered reference easier. The point is not an important one, however, especially as the volume is provided with a good index.

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As the authors observe, it is high time that the ostrich farmer should have full knowledge of the nature and special characteristics of foodstuffs from which he may make choice. After many years of practical experience he still has but little knowledge of the composition of foods in daily use—indeed, ignorance in this respect has been responsible for many of the difficulties and disappointments at present incidental to the industry. Take, for example, the question of the feeding of maize. There are many ostrich farmers who are feeding three and four pounds of maize per day—which they describe as a "sufficient ration" for a fullgrown bird. This the authors of "Ostrich Foods and Feeding" hold to be excessive, and they present a good case in favour of their view. Maize, they remind us, is pre-eminently a fattening, heating, and energy-giving food; and they observe that "it is all but certain that the custom of feeding breeding birds mainly on maize, the staple food because it is easily procurable and cheap, is most detrimental in its results." Ostrich farmers who desire to make a proper study of the problems of feeding and the effects and comparative values of the various kinds of food, would do wisely to invest in a copy of Messrs. Dowsley and Gardner's book. It is evidently the result of long and careful study, and the results which it presents cannot fail to be of much value to the industry. We append a notice of the book which we have received from the well-known ostrich-farmer, Mr. A. T. Rivett-Carnac, President of the Koonap Farmers' Association, which is of value as recording the impressions of an ostrich breeder.

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Mr. Rivett-Carnac writes: When in years gone by the scientists of Europe turned their attention to improving farming by scientific research, they did not find on arriving at their conclusions that the practical methods of the farmers were wholly wrong. But they were able to show the reasons for what was being done, and that the same and often better and more economic results could be obtained by other methods. In the same way Messrs. W. S. Dowsley and Charles Gardner have in their book "Ostrich Foods and Feeding" collected facts that should be of the greatest assistance not only to ostrich farmers but to all stock owners. In the overcrowded countries of Europe success in farming is only possible by the strictest attention to the economic feeding of stock and the economic cultivation of lands. Ignoring these spells failure, and it is recognized that

only by following the paths of economy will agriculture succeed. In our wide land of South Africa where 2500 acres is a small holding and the virgin soil seems inexhaustable, small economies in farming have not hitherto been studied. But a new era has begun, more intensive farming is now being practised, the progressive farmer has to consider how he can most cheaply and effectually improve his farm and farming. To all such farmers "Ostrich Foods and Feeding" should be an invaluable asset. The book deals mainly with ostrich feeding and feather production, but the feeding values given will be found most useful to farmers of all classes of stock. One of the many features is its copious references to different authorities, which should enable those interested to follow up various subjects should they be so inclined. Very special mention is made of the overfeeding of mealies, a very common practice in this country where mealies are cheap and the handiest grain to feed. Though excellent when fed in the right proportion with other food stuffs, their exclusive use is undoubtedly detrimental. It is possible that the low percentage of fertile eggs from ostriches is due to the overfeeding of mealies. The subject is fully dealt with in the chapter on breeding birds, and at the end of the chapter a number of proposed rations is given which should be well worth a trial. All through the book the authors in dealing with feeding have considered those foods easily procurable in this country and in many cases they have had special analysis made of the various foodstuffs commonly used by farmers here. The theory of foods and feeding is explained in so simple a language that the farmer, even though the subject be new to him, should have no difficulty in grasping it, and having grasped it will regard a bag of mealies or a field of lucerne in quite a new light, to the saving of his pocket and the improvement of his stock. Bone and its use as a food is dealt with in a chapter by itself, which should do much to make its value better understood. In dealing with lucerne the authors have given much valuable information, not only on the feeding of it, but also on its cultivation and treatment, and the growing doubt whether lucerne when fed alone is the most ideal feather producer is supported by the statement that it is "too unbalanced a food for feeding alone." The chapter on other foods which could be grown should help the farmer to form a basis on which to work out a crop rotation to the betterment of his lands and his farming generally, and is in itself of great value. The chapter on foodstuffs and their effect is excellent. It includes tables of foodstuffs with their relative values as flesh and feather formers, heat and fat formers, and bone formers. On the grasping of the relative values and costs of these the whole basis of economic feeding depends. A great feature of the book is the index, which is exhaustive and enables any subject to be turned up in a moment. Altogether Messrs. Dowsley and Gardner are to be congratulated on the excellence of their production. The work will outlive them and will remain the foundation stone of similar works which may follow. To them, however, will remain the honour of being the first to collect and publish in a handy form the statistics on "food and feeding" applicable to our South African conditions.

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**Miscellaneous Notes.**

We have received from the Secretary of the Swedish Chamber of Commerce in London (5 Lloyd's Avenue, E.C.) a copy of the special tar and wood by-product number of the journal of the Chamber, and are asked to say that readers interested in the wood, tar, and allied

trades may obtain (post free), on writing to the secretary, a copy of the above special issue. Correspondents should mention the *Agricultural Journal* in making application.

PEACH TREE APHIDES.—Owing to a misreading of the manuscript, the dates given on pages 229 and 230 of the August issue of the *Journal,* under the sub-heading "Laboratory Tests of Tobacco Extracts," were incorrectly given. In the manuscript the dates were written IX.7.12, IX.9.12, and IX.10.12. In the setting these were rendered 9th July, 1912, 9th September, 1912, and 9th October, 1912, whereas they should have been 7th September, 9th September, and 10th September.

MAIZE SHOW.—A successful maize show was held at Springbok Flats on the 6th September under the auspices of the local Farmers' Association. Owing to severe drought entries were few, but those shown were of good quality. Mr. Alex. Holm, Under-Secretary for Agriculture Education, acted as judge. The opening ceremony was performed by His Honour the Administrator, and a short lecture on cattle and agriculture generally was delivered by Mr. E. McMillan, the Principal of the Potchefstroom School of Agriculture. The attendance at the show was large, and altogether the local Farmers' Association is to be congratulated upon the general success of its first maize show.

IMPORTATION OF PLANTS.—As from the 1st October, 1913, the following plants are added to the list of plants which, under sub-section (1) of section *nine* of the Act, no person shall introduce or cause to be introduced from oversea into the Union, viz.: (1) stone fruits in their fresh state, including apricots, plums, peaches, nectarines, and cherries; and (2) rooted plants for budding and grafting, except rooted almond, pear, plum, and cherry stock; and grapes are removed from the list. Proclamation No. 37, dated the 22nd February, 1912, is superseded.

SOUTH AFRICAN GLUCOSE.—We are informed by the Commissioner of Customs that inquiries have recently been addressed to the Commerce and Industries Section of the Customs Department regarding South African manufactured glucose. At the present time the only firm known to be in a position to manufacture this article is the Wartburg Starch Co., Natal. Although no glucose is actually being turned out yet, this company is understood to be in a position to manufacture it in the event of there being a sufficient demand for it. It is of interest to note that the amount of glucose imported into the Union during 1912 was over 1300 tons, valued at £14,099.

DEATH OF SHORTHORN BULL AT POTCHEFSTROOM.—The Red Lincoln Shorthorn bull recently imported by the Department of Agriculture for use at the Government Experiment Farm, Potchefstroom, has unfortunately failed to pass the tuberculin test to which he was submitted soon after arrival. The animal was slaughtered in due course, and post-mortem examination revealed lesions indicating extensive infection not recent in origin. The loss is a serious one, as the animal was of a very high standard of merit, inasmuch as while being bred and showing remarkable symmetry and quality for a Lincoln Red, he was also bred from a strain of Lincoln Reds possessing high milking qualities. He was bred by Mr. John Evans, of Burton, Lincoln.

MR. MUNRO HULL'S ALLEGED DISCOVERY.—On the 13th February last Mr. Wessels asked a question in the House of Assembly regarding the reported discovery of a tick-destroying organism by a Mr. Munro Hull, of Queensland, Australia, to which the Minister of Agriculture replied that all available information had been cabled for from the Queensland Government. The Secretary for Agriculture has been in communication both with the Under-Secretary for Agriculture at Brisbane and with Mr. Munro Hull himself on the subject. Mr. Hull's claim is that he has discovered a disease which, although harmless to cattle, is fatal to the cattle tick, and he has arranged with Professors Wallace and Nuthall, of Edinburgh and Cambridge Universities, for an investigation as to whether a vaccine containing the organism which Mr. Hull holds to be effective in destroying ticks could not be elaborated. On the other hand, it appears that the Queensland Department of Agriculture has been engaged in testing the efficacy of Mr. Hull's alleged discovery, and that the results of the investigation have been of a negative nature.

# Notes from the Schools of Agriculture.

## CONFERENCE OF HORTICULTURISTS.

THE first annual conference of horticulturists in the employ of the Department of Agriculture was held in Pretoria on the 5th and 6th August. The meeting took place in the offices of the Department, and was opened by Mr. Alex. Holm, Under-Secretary for Agricultural Education, and presided over by Mr. R. A. Davis, Chief of the Division of Horticulture. There were present: Messrs. Tribolet (Horticulturist, Elsenburg), Sturm (Horticulturist, Potchefstroom), Parsons (Horticulturist, Cedara), Terry (Horticulturist, Grootfontein), Simmonds (Horticulturist, Experimental Citrus Orchard, Warmbaths), and Le Sueur (Horticulturist, Experimental Orchard, Ermelo). Mr. Scott (Horticulturist at Glen) was unfortunately unable to be present owing to illness.

Numerous subjects were brought forward for discussion, comprising the different spheres of usefulness as between the horticultural staff under the Chief in Pretoria and the horticulturists who are members of the staffs of the various schools of agriculture. It may be stated, for public information, that all matters connected with legislation on horticultural subjects, together with all business relating to fruit export, are dealt with by the Chief Horticulturist, also technical matters concerning the work of the orchards attached to the schools, whilst the horticulturists at the schools will deal with local inquiries

from the public on matters connected with fruit growing and kindred subjects, in addition to their duties as instructors and lecturers at the different educational institutions.

Discussion ensued in connection with the selection of the text-books for use at the agricultural schools and the syllabus of instruction was decided upon.

It was decided that experimental work in connection with various tests of stocks, etc., put forward by the Cape Western Province farmers should be undertaken at Elsenburg; and that, in view of the restrictions to be imposed on the import of blight-proof apple stocks in October, 1915, demonstrations should be made at each college where suitable conditions prevailed of the different methods to be resorted to for the production of an apple supply of such stocks within the borders of the Union.

It was also decided to undertake a series of experiments with regard to determining the efficacy of certain supposed preventive measures against bitter pit of the apple and "silver leaf" of the peach, plum, and almond.

At each school tables of dates of blossoming and all other useful data relating to the different varieties of fruits there produced are to be kept and the information to be obtained will be made public, either by bulletins or through the medium of the *Agricultural Journal*. In addition, manurial tests will be carried out on a representative scale and results published in a similar manner.

Some time was spent in comparing notes and views on pollination, fertility, and sterility of different varieties, and also in discussing the advisability of the use of quince roots for certain kinds of pears.

Conferences such as these can only result in good. The interchange of ideas on points in dispute or practices in vogue in different parts of the Union tends to broaden the outlook of the individual and increases his power of observation and receptivity, thus rendering him of greater use to the State. It is at present proposed that such annual meetings shall be held at one or other of the schools alternately with Pretoria, and that the next should take place at Elsenburg somewhere about June next.

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## CONFERENCE OF CHEMISTS.

A conference of the chemical staff of the Department of Agriculture was held in Pretoria on the 2nd, 3rd, and 4th of September, at the offices of the Chemistry Division, for the purpose of discussing agricultural chemical work throughout the Union. The following were present: Messrs. H. J. Vipond (Chief of the Division of Chemistry)—who acted as chairman—D. C. Crawford (Elsenburg), C. Williams (Cedara), T. G. W. Reinecke (Potchefstroom), and A. Stead (Grootfontein).

The proceedings consisted of the drawing up of regulations governing the analysis of agricultural materials by the Department and of a uniform scale of fees for this work, and the discussion of such matters as methods of analysis of agricultural materials, staff, and equipment, investigational work, subject matter of courses in agricultural chemistry at the schools of agriculture, and other matters of an advisory nature.

## ELSENBURG IN AUGUST.

The advent of spring finds Elsenburg all abustle. The Chemical Laboratory is being extended; the sanitary drainage scheme has been completed; the quarters are well under process of renovation; and a new site for the poultry division has been chosen and the work is well advanced.

Heavy rains have fallen of late, to such an extent that the water-courses on the farm have proved inadequate. The rainfall has exceeded the average: the total precipitation for the eight months ended 31st August was 21.6 inches, of which 5.98 inches fell during the month of August. The maximum temperature was 73.9 degrees and the minimum 39.3 degrees.

The field crops are looking remarkably well, and the animals are all in good condition. Sixty acres of land have been ploughed, apart from ploughing done in the vineyards, orchards, and nurseries.

Propagation work has been carried on extensively. In the fruit nursery 3500 American stocks were planted out for rooting, 2700 Aramon cuttings were grafted with Cabernet Sauvignon, and 400 Jacquez with sultanas; 1000 almonds, 100 walnuts, 500 pears, and 800 apple seeds were planted.

The variety tests of grasses have been established, while ten acres of land were cleared of bush, ploughed, harrowed, plotted out, and sown with the seeds of trees for the new arboretum.

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## CEDARA.

There is a considerable demand for poultry. The equipment of the poultry division has been increased, and the students have taken part in the construction and erection of new poultry houses.

Investigations in connection with the grading of wattle bark are being carried out.

The principal, the chemist, and the botanist attended a meeting of the delegates of those interested in this matter, held in Durban on the 25th September.

At the sub-station (Winkel Spruit) a dipping tank is in course of erection, and it is hoped to establish a dairy herd there very soon. The chicory crop has been harvested and there is a small quantity for disposal. Sugar-cane selection experiments, with a view to improvement of the Uba variety, have been commenced.

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## GROOTFONTEIN.

On the 12th September a lecture on the breeding and management of ostriches was delivered by Mr. R. W. Thornton, the Principal, at the City Hall, Port Elizabeth. This was the first of three lectures arranged by the Technical College.

Mr. H. B. Terry, the newly appointed Lecturer and Instructor in Horticulture, has been busy laying out a new experimental orchard, and most of the trees have already been planted. While the neighbourhood may not be regarded as an ideal fruit-growing district, the orchard will serve a purpose in the education of the students.

## STAFF CHANGES.

Mr. J. Gow, Dairy Instructor at Elsenburg, has been transferred to the Division of Dairying, and Mr. J. Allison has been appointed to take his place.

Mr. J. Fisher has been promoted to the position of Vice-Principal of the School of Agriculture, Cedara.

Mr. W. C. Mitchell, Farm Manager at Cedara, has resigned, and his place has been taken by Mr. A. Ireland.

Mr. A. K. Hards, Agricultural Assistant at Grootfontein, has resigned, and his place has been taken by Mr. A. E. Mills.

Mr. M. Lundie has been appointed Assistant Chemist at Grootfontein, and Mr. H. B. Terry, Lecturer and Instructor in Horticulture.

Mr. C. R. Morris, Lecturer in Engineering at Grootfontein, has resigned.

Mr. A. Stead, of the Department of Public Health, Bloemfontein, has been appointed on the staff at Grootfontein, where he will test the theories he has advanced as to the deficiency of vitamines being the cause of lamziekte.

Mr. P. A. Hayman has been appointed Farm Manager at Potchefstroom, and Mr. C. Douglas-Golding, Assistant Chemist.

Mr. E. A. Visser, Manager of the Malmesbury Station, has severed his connection with the Department, and Mr. A. E. Darvell has been transferred from Robertson to fill his place.

# Correspondence.

**This section is set aside for correspondence on all subjects affecting the Farming Industries of the Union of South Africa and cognate matters; and, while every reasonable latitude will be allowed, contributors are requested to be as concise and succinct as possible in the expression of their views.**

**Suggestions for practical consideration and discussion, and hints as to improved methods applicable to any branch of agriculture, are particularly welcome.**

**It must at all times be distinctly understood that the Department of Agriculture is in no sense responsible for the views and opinions expressed in this section.**

**All communications should be clearly addressed "The Editor of the *Agricultural Journal*, Department of Agriculture, Pretoria," and written on one side of the paper only.**

## IS SOUTH AFRICA DRYING UP?

To the Editor of the *Agricultural Journal*.

SIR,—It is now, and has been for many years past, a common remark that the climate of South Africa generally has undergone a change for the worse, and it is common knowledge that the rainfall has gradually decreased all over South Africa. The result is that springs at one time looked upon as inexhaustible have dried up and even rivers have become dry dongas or next to it. This subject has doubtless caused much speculation to large numbers of people, and farmers have had reason to deplore the want of a well-distributed rainfall such as was general twenty-five years ago.

Now, I venture to think that the cause of the gradual decrease in the quantity of the rainfall is a very simple one indeed. Old residents will at once understand the cause when I explain my theory, but for the benefit of newer residents I will explain more fully. Many years ago, before the advent of the white man, the whole of South Africa was thickly overrun with vast herds of game of all kinds. They mostly kept to the plains of the high veld in summer and migrated to the plains of the low veld in winter. The habits of these animals led them to desire mud baths, and these were gradually formed by first one and then others rolling in certain spots of soft ground after rain had fallen. By degrees these spots became shallow pools about ten feet in diameter and up to three feet in depth. Old residents will recollect that vast plains were at times covered with thousands of these pools and that they existed practically all over South Africa. At certain times of the year during the rainy seasons these pools were filled with rain, forming a constant supply of water, which by percolation formed springs and by evaporation caused a great rainfall. With the destruction of these vast herds of game the mud pools have disappeared and there is now no storage of water on the high veld. The consequence is that the rainfall has decreased and springs have become dry.

Now, in order to obtain a rainfall and to allow the springs to recover their old-time vitality two or three things are necessary. First, the general spread of agriculture, which, by loosening the soil, allows greater absorption of water when rain falls; secondly, tree planting; and thirdly, the formation of dams. There are also other means of greatly supplementing the available water supply which I shall be glad to discuss if there be any one in authority interested enough to hear my views upon the matter—means which I believe to be perfectly feasible, which would do an enormous amount of good, increase the rainfall, and replenish the springs to an appreciable extent.

I was born in this country and have seen a good deal of it, and made a study of its conditions, and I consequently have its interests at heart. This must be my excuse for trespassing upon your time and space.—Yours, etc.,

R. B. CHASE.

246 Clark Road, Durban.

# Leasing of Government Stallions, 1913-14.

THE following particulars regarding the leasing of Government stallions for the season 1913-14 are published for general information.

Details in regard to the breed, general characteristics, etc., of each horse and the conditions governing his lease appeared on page 949 of the June issue of the *Agricultural Journal*.

| Name of Stallion. | Breed. | Maximum Fee to be charged by Lessee for service of each Mare. | Name of Lessee. | Address of Lessee. |
|---|---|---|---|---|
| Sir Reginald | Thoroughbred | 60s. | A. A. MacDonald | "Nooitgezien," Volksrust, Tvl. |
| Mon Roy | ,, | 60s. | P. J. de Jager... | Box 24, Volksrust, Transvaal. |
| The Phoenician | ,, | 60s. | Smit & Uys ... | "Smithfield," Ermelo, Tvl. |

| Name of Stallion. | Breed. | Maximum Fee to be charged by Lessee for service of each Mare. | Name of Lessee. | Address of Lessee. |
|---|---|---|---|---|
| **Greenwood** | Thoroughbred | 55s. | W. R. Collins ... | Ermelo, Tvl. |
| **Cairn Ryan** | „ | 50s. | C. X. Smith ... | P.O. Val Station, Standerton, Tvl. |
| **Proxy** ... | „ | 45s. | J. L. v. Heerden | "Uitvlucht," Marico, Tvl. |
| **Florismart** | „ | 40s. | J. H. v. d. Merwe | "Rietfontien," P.O. Leeuwspruit (via Balfour), Dist. Heidelberg, Transvaal. |
| **D'Arcy** ... | „ | 40s. | H. G. Grove ... | P.O. Irenedale, Standerton, Tvl. |
| **Radium** ... | Hackney ... | 45s. | F. J. McHattie | Box 25, Balfour, Transvaal. |
| **Jargeau** ... | Percheron ... | 40s. | A. Cason ... | P.O. Cedarmont, Standerton Dist., Transvaal. |
| **Lord of Tottenhill** | Hackney ... | 40s. | Zoutpansberg Agricultural Society | Box 26, Pietersburg, Transvaal. |
| **Wilkins Micawber** | Thoroughbred | 75s. | Queenstown Farmers' Association | Queenstown, C.P. |
| **Hearwood** | „ | 50s. | Thaba 'Nchu Agricultural Society | Thaba 'Nchu, O.F.S. |
| **Silver Wedding** | „ | 60s. | P. J. Swanepoel | "Beersheba," Smithfield, O.F.S. |
| **Valiant** ... | „ | 60s. | C. T. Ross ... | "The Cliff," Dewetsdorp, O.F.S. |
| **Quelpart** ... | „ | 60s. | E. T. Kruger ... | "Geduldfontein," Kroonstad, O.F.S. |
| **Ninian** ... | „ | 60s. | C. T. Vermaak Brothers | "Kalverfontein," Private Bag, Good Hope, Dundee, Natal. |
| **Blue Streak** | „ | 50s. | J. B. Neethling | Box 33, Boshof, O.F.S. |
| **Sang Bleu** | „ | 50s. | H. R. Plewman | "Kuilfontein," Colesberg, C.P. |
| **Alcedo** ... | „ | 50s. | W. M. Bowker | "Sterkfontein," P.O. Bushman's Kop, Wepener, O.F.S. |

| Name of Stallion. | Breed. | Maximum Fee to be charged by Lessee for service of each Mare. | Name of Lessee. | Address of Lessee. |
|---|---|---|---|---|
| **Hermiston** | Thoroughbred | 50s. | J. H. Olivier ... | "Olifants Been," Zastron, O.F.S. |
| **Shortboat** | " | 40s. | C. J. Prinsloo... | P.O. Paul Roux, District Senekal, O.F.S. |
| **Barkston Ash** | " | 40s. | C. M. Maynard | Mngqungu, Qumbu, East Griqualand, C.P. |
| **Rappe** ... | Oldenburg ... | 50s. | T. van Reenen | "Italie," Box 47, Ladybrand, O.F.S. |
| **Sentinel** ... | Thoroughbred | 40s. | C. du T. Thom | "Hope Royal," Vrede, O.F.S. |
| **Red Lord** | Hunter-bred | 35s. | M. J. Kohler ... | "Glen Walton," P.O. Frankfort, O.F.S. |
| **St. Patrick** | " | 40s. | C. P. Cross ... | "Kimberley," Frankfort, O.F.S. |
| **Wildschutz** | Oldenburg ... | 40s. | A. F. Schmidt | Kromspruit, Box 188, Bloemfontein, O.F.S. |
| **Kinsos** ... | Percheron ... | 40s. | J. G. Roos ... | "Concordia," Tiger River Stn., Bethlehem, O.F.S. |
| **Boss Up** ... | Thoroughbred | 50s. | J. Pierce ... | Heilbron, O.F.S. |
| **Merrimac** | " | 50s. | Montague Gadd | "Springfield," Tafelberg, C.P. |
| **Patron Saint** | " | 60s. | Post Retief Farmers' Association | Fort Beaufort, C.P. |
| **Iron Pirate** | " | 50s. | Vryburg Farmers' Association | Vryburg, British Bechuanaland, C.P. |
| **Heacham Watchman** | Hackney ... | 50s. | Clocolan Agricultural Society | Clocolan, O.F.S. |
| **Cyllaros** ... | Thoroughbred | 40s. | M. A. Miles ... | Thomas River, C.P. |
| **Peeping Light** | " | 35s. | A. K. Adendorff | "Arlington," Seymour, C.P. |
| **True Metal** | " | 35s. | Cape Flats Farmers' Association | Claremont, Cape, C.P. |
| **Bury Cicero** | Hackney ... | 50s. | Darling Agricultural Society | "Glen William," Darling, C.P. |

| Name of Stallion. | Breed. | Maximum Fee to be charged by Lessee for service of each Mare. | Name of Lessee. | Address of Lessee. |
|---|---|---|---|---|
| **Athlete** ... | Clydesdale ... | 30s. | H. L. Aucamp | "Scholtzburg," P.O. Modder River, Kimberley, C.P. |
| **Jasmin** ... | Percheron ... | 40s. | R. Kolver ... | Mauritzkop, Philippolis, O.F.S. |
| **Jack** (Elsenburg) | Catalonian ... | 45s. | J. J. de Villiers (M. J.'s son) | "Dungrye Park," Caledon, C.P. |
| **Tiripapa** ... | Thoroughbred | 50s. | Stoffel Marais | Malan Spruit, Willow Grange Siding, Natal. |
| **Sloanston** | " | 45s. | P. W. v. Rooyen | "The Gem," Greytown, Natal. |
| **Ballyhooley** | " | 40s. | M. J. Gregory... | "Frischgewaagd," P.O. De Dam, Utrecht, Natal. |
| **De Mist** ... | " | 35s. | R. E. Ovens ... | Mount Prospect, Natal. |
| **Perrier** ... | " | 35s. | James Morrison | "Blockcraig," Biggarsberg, Waschbank Stn., Natal. |
| **King of All** | Clydesdale ... | 40s. | W. J. Fly ... | "Vaucluse," Elandskop, Impendhle, Natal. |
| **Bedminster** | Thoroughbred | 40s. | W. M. Cheyne | Box 33, Ventersdorp, Transvaal. |
| **Examiner** | " | 60s. | J. P. de Wet ... | Box 22, Boshof, O.F.S. |

*N.B.*—Negotiations are still proceeding in regard to the lease of certain remaining stallions, and particulars of these will be published in due course.

ALEX. HOLM,
*Under-Secretary for Agriculture.*

Union Department of Agriculture,
Pretoria.

# Egg-laying Competitions.

## NOTES AND FIGURES FOR AUGUST.

MR. W. O. JOHN, Poultry Division, Elsenburg School of Agriculture, writes :—

I submit report of my monthly visit to Rosebank Laying Competition, Cape Province.

As will be seen from the figures the birds at this competition are now settling down to work in real earnest, and the returns are remarkably even. Heavy rains were experienced during the first part of the month (in fact, the heaviest rains for many years), with fine warm days during the latter part of the month. The birds are looking very fit. I have only noticed one general feature right along the pens, i.e. a tendency to looseness of the bowels. This, I think, is caused by the highly concentrated nature of the whale meal fed to the birds. There were only three or four "brooders" on day of my visit, and these are almost ready to return to their respective pens. All the runs were dry, and as usual, houses, etc., spotlessly clean.

## ROSEBANK EGG-LAYING COMPETITION.

## WESTERN PROVINCE AGRICULTURAL SOCIETY.

(1*st May*, 1913, *to* 30*th April*, 1914.)

RECORD FOR AUGUST, 1913.

| Pen Number. | Owner. | Variety. | Record for August. | Total to 31st August. |
|---|---|---|---|---|
| 1 | F. T. Mills ... ... ... ... | White Rocks ... ... | 80 | 138 |
| 2 | N. H. M. Cole ... ... ... ... | White Wyandottes ... | 87 | 218 |
| 3 | F. T. Mills ... ... ... ... | White Rocks ... | 25 | 25 |
| 4 | S. C. Skaife ... ... ... ... | White Wyandottes ... | 75 | 282 |
| 5 | E. F. Watermeyer ... ... ... | Croad Langshans ... | 68 | 103 |
| 6 | H. H. Bright ... ... ... ... | White Leghorns ... | 78 | 160 |
| 7 | S. Smith ... ... ... ... ... | " ... | 85 | 298 |
| 8 | N. H. M. Cole ... ... ... ... | Brown Leghorns ... | 82 | 248 |
| 9 | Jas. Cook ... ... ... ... ... | White Leghorns ... | 73 | 196 |
| 10 | R. G. Hudson ... ... ... ... | " ... | 88 | 196 |
| 11 | N. H. M. Cole ... ... ... ... | " ... | 57 | 157 |
| 12 | Hatherley Poultry Farm ... ... | " ... | 75 | 189 |
| 13 | C. S. Boyes ... ... ... ... | " ... | 89 | 245 |
| 14 | H. H. Bright ... ... ... ... | " ... | 78 | 163 |
| 15 | Mrs. R. F. Dott ... ... ... ... | " ... | 75 | 169 |
| 16 | T. Vollmer ... ... ... ... | " ... | 78 | 95 |
| 17 | " ... ... ... ... | " ... | 57 | 132 |

| Pen Number. | Owner. | Variety. | Record for August. | Total to 31st August. |
|---|---|---|---|---|
| 18 | C. W. Baldock ... ... ... ... | White Leghorns ... | 77 | 251 |
| 19 | S. Smith ... ... ... ... ... | " ... | 71 | 191 |
| 20 | Mrs. R. Archibald ... ... ... | " ... | 73 | 214 |
| 21 | B. Kauffmann ... ... ... ... | " ... | 85 | 226 |
| 22 | G. J. V. Biccard ... ... ... ... | " ... | 93 | 185 |
| 23 | C. S. Boyes ... ... ... ... | " ... | 85 | 150 |
| 24 | H. H. Bright ... ... ... ... | " ... | 71 | 160 |
| 25 | S. Smith ... ... ... ... ... | " ... | 84 | 162 |
| 26 | W. L. H. Rose ... ... ... ... | " ... | 79 | 132 |
| 27 | H. N. Wheeldon ... ... ... ... | " ... | 86 | 242 |
| 28 | B. Kauffmann ... ... ... ... | Black Leghorns ... | 64 | 185 |
| 29 | O. C. Macpherson ... ... ... | White Leghorns ... | 88 | 152 |
| 30 | W. and H. Meihuizen ... ... ... | " ... | 51 | 147 |
| 31 | Graham Hope & Co. ... ... ... | " ... | 99 | 259 |
| 32 | H. Curtis... ... ... ... ... | " ... | 62 | 130 |
| 33 | A. Aitken... ... ... ... ... | " ... | 70 | 108 |
| 34 | R. G. Hudson ... ... ... ... | " ... | 47 | 121 |
| 35 | H. H. Bright ... ... ... ... | Black Leghorns ... | 67 | 148 |
| 36 | G. J. V. Biccard ... ... ... ... | White Leghorns ... | 80 | 152 |
| 37 | W. H. Hart ... ... ... ... | " ... | 75 | 122 |
| 38 | R. G. Hudson ... ... ... ... | " ... | 80 | 129 |
| 39 | B. Kauffmann ... ... ... ... | " ... | 88 | 192 |
| 40 | Mrs. R. A. Leggatt ... ... ... | Anconas ... ... | 90 | 186 |

## ELSENBURG MONTHLY REPORT FOR AUGUST OF EGGS LAID BY BREEDING PENS.

| Pen No. | Breeds. | No. of Hens. | May Eggs. | June Eggs. | July Eggs. | Aug. Eggs. | Total Eggs. |
|---|---|---|---|---|---|---|---|
| 1 | Indian Game ... ... ... ... | 3 | 23 | 11 | 15 | 17 | 66 |
| 2 | Black Rocks ... ... ... ... | 4 | 37 | 30 | 73 | 43 | 183 |
| 3 | White Rocks ... ... ... ... | 4 | 53 | 67 | 48 | 85 | 253 |
| 4 | White Wyandottes ... ... ... | 6 | 86 | 64 | 76 | 88 | 314 |
| 5 | Barred Rocks ... ... ... ... | 3 | 50 | 39 | 28 | 60 | 177 |
| 6 | White Leghorns ... ... ... ... | 5 | 67 | 73 | 68 | 47 | 265 |
| 7 | Black Minorcas ... ... ... ... | 6 | Nil. | Nil. | 29 | 71 | 100 |
| 8 | Black Leghorns ... ... ... ... | 6 | 61 | 65 | 59 | 88 | 273 |
| 9 | Brown Leghorns ... ... ... | 6 | 32 | 31 | 52 | 84 | 199 |
| 10 | White Orpingtons ... ... ... | 4 | 94 | 75 | 49 | 69 | 287 |

During August remarkable weather has been experienced; there were floods of rain (the worst for many years); fine warm days between the rainy periods have, however, materially benefited the birds. As could be expected, the pens with two exceptions have materially increased on the July output. Pen 2, owing to broodiness, has dropped back somewhat, also pen 6. The very wet weather, I think, is responsible for the falling-off of this pen. The other eight pens have made satisfactory progress, the total for the ten pens for July month being 497 and for August 652. The general health of birds remains excellent. The fertility of eggs, with few exceptions, has been good.

W. A. JOHN, Poultry Division.

# South African Produce Markets.

## CAPETOWN.

The Produce Department of the firm of R. Müller, Capetown, reports under date of the 27th September, 1913, as follows :—

*Ostrich Feathers.*—Supplies, sales, and exports of ostrich feathers have not been much since I published my last report.

Moderate quantities have changed hands, more or less at my previous quotations.

As the next London sales are timed to open on the 6th proximo, exporters are hesitating. The Capetown manufacturers are not in any great need, and consequently, the market is not spirited, although fairly satisfactory prices can still be realized, as will be seen from the following quotations :—

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| Primes | 18 | 0 | 0 | to | 37 | 10 | 0 |
| First | 10 | 10 | 0 | „ | 15 | 10 | 0 |
| Second whites | 6 | 10 | 0 | „ | 9 | 10 | 0 |
| Third whites | 4 | 10 | 0 | „ | 6 | 0 | 0 |
| Inferior and stalky whites | 2 | 10 | 0 | „ | 4 | 10 | 0 |
| Byocks and fancy | 3 | 0 | 0 | „ | 10 | 0 | 0 |
| Superior feminas | 11 | 10 | 0 | „ | 15 | 0 | 0 |
| First feminas | 8 | 0 | 0 | „ | 10 | 10 | 0 |
| Second feminas | 5 | 10 | 0 | „ | 7 | 10 | 0 |
| Third feminas | 2 | 10 | 0 | „ | 4 | 10 | 0 |
| Greys | 3 | 10 | 0 | „ | 9 | 10 | 0 |
| White boos | 1 | 10 | 0 | „ | 2 | 10 | 0 |
| Light boos | 0 | 15 | 0 | „ | 2 | 0 | 0 |
| Dark boos | 0 | 5 | 0 | „ | 0 | 15 | 0 |
| Inferior boos and tipless | 0 | 2 | 6 | „ | 1 | 5 | 0 |

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| Long blacks | 3 | 0 | 0 | to | 5 | 0 | 0 |
| Medium blacks | 1 | 5 | 0 | „ | 3 | 0 | 0 |
| Short blacks | 0 | 5 | 0 | „ | 1 | 0 | 0 |
| Long floss blacks | 1 | 5 | 0 | „ | 2 | 0 | 0 |
| Medium floss blacks | 0 | 15 | 0 | „ | 1 | 5 | 0 |
| Short floss blacks | 0 | 7 | 6 | „ | 0 | 15 | 0 |
| Long drabs | 2 | 10 | 0 | „ | 3 | 10 | 0 |
| Medium drabs | 0 | 15 | 0 | „ | 2 | 0 | 0 |
| Short drabs | 0 | 5 | 0 | „ | 0 | 10 | 0 |
| Long floss drabs | 1 | 10 | 0 | „ | 2 | 0 | 0 |
| Medium floss drabs | 0 | 17 | 6 | „ | 1 | 10 | 0 |
| Short floss drabs | 0 | 5 | 0 | „ | 0 | 10 | 0 |
| Inferior long blacks and drabs | 1 | 5 | 0 | „ | 2 | 10 | 0 |
| Common blacks and drabs | 0 | 2 | 0 | „ | 0 | 5 | 0 |
| Spadonas | 0 | 15 | 0 | „ | 5 | 0 | 0 |

*Wool.*—On the 23rd inst. the London auction sales were opened. On that day 11,100 bales were offered whereof 350 bales were of Cape origin. The attendance and competition were good. Whilst cross-breds sold at par and at a reduction of 5 per cent., other sorts, including Capes, were steady. In all, 170,000 bales were to be disposed of, of which 4000 from the Cape.

At the Capetown market small quantities changed hands, partly by public auction, partly out of hand. Local competition proved good enough, and I am able to quote as follows :—

| | d. | | d. |
|---|---|---|---|
| Calvinia, long | 7 | to | 7¾ |
| Calvinia, medium | 6 | „ | 7 |
| Karroo and Roggeveld | 6½ | „ | 10 |
| Short burry wools, heavy | 4 | „ | 4¾ |
| Short burry wools, light | 4¾ | to | 5½ |
| C. and C., best grease | 6 | „ | 6⅝ |
| C. and C., medium | 5 | „ | 6 |
| C. and C., inferior | 2 | „ | 4 |

*Skins.*—The exports of skins have been quite normal during the current month. Prices were well maintained, in fact medium Capes advanced to 2s. 7d.

Skins are now being purchased here in any quantity at the following rates, viz. :—

| | | |
|---|---|---|
| Goatskins, light | 12¾d. | per lb. |
| Goatskins, heavy | 10¾d. | „ |
| Sundried and kids | 8d. | „ |
| Angoras | 7d. | „ |
| Caledon | 7½d. | „ |
| Longwools, Karroo | 6½d. | „ |
| Shortwools | 5d. | per lb. |
| Pelts and damaged | 4¼d. | „ |
| Capes, large | 3s. 4d. | each. |
| Capes, medium | 2s. 7d. | „ |
| Capes, cut | 1s. 6d. | „ |
| Capes, damaged and lambs | 7d. | „ |

*Hides.*—The market remains strong, and there is no difficulty in selling large parcels for export.

Prices are :—

| | | |
|---|---|---|
| Sound heavy hides | 11d. | per lb. |
| Damaged hides | 8d. | „ |

## EAST LONDON.

The Produce Department of Messrs. Malcomess & Co., Ltd., write as follows under date 29th September, 1913:—

We have much pleasure in confirming our lines of the 30th ult.

*Wool.*—The month now under review has brought with it a great deal that was of importance to the wool trade.

During the first week cables advised that the Australian season had commenced, the sales at the various chief centres registering a level of prices somewhat lower than was the case twelve months ago. From this it was concluded that the European markets might recede somewhat in sympathy, and some operators held this idea to the extent that—against a Bradford spot quotation of about 28¼d. to 28½d.—they, as we hear, concluded some forward sales December-January delivery at 28½d. How they will fare remains to be seen. Certainly nothing could be bought in the South African markets at present to stand in at the lower price.

*Antwerp.*—On the 18th inst. the Antwerp sales of River Plate wools opened before a fair attendance of buyers, and registered an advance of 2½ per cent. for merinos, cross-breds being weak; the latter class being undoubtedly influenced by the large quantities held over after the last London sales, plus new arrivals.

*London.*—Tuesday, the 23rd inst., saw the opening night of the fifth series of London Colonial wool sales—170,000 bales coming under the hammer, of which about 100,000 are cross-breds and 4000 Capes.

Cables to hand report:—

| | |
|---|---|
| Short grease | Unchanged. |
| Combing grease | „ |
| Snowwhites | In some cases 5 per cent. higher owing to scarcity of supplies. |

With attendance of buyers and competition satisfactory.

The further progress of the sales seems to depend largely on America. The American Tariff, admitting wool in on the free list, becomes operative as from 1st December. If the American buyers operate so as to get wool in immediately same is admitted "free," we may get higher priees. If they prefer to wait for the November series, the best we can hope for is maintenance of prices.

*Bradford.*—Prices for Tops have ruled between 28¼d. and 28½d., some parcels lacking in length going at 28d.

*The Continental Markets* have been very quiet indeed, practically no business having been doing. This was due to the extension of the holiday period, but with spinners booking fresh orders now, a brisker state of affairs may be expected.

*Wool Clips.*—The early estimates for the ensuing clips speak of an increase of over 100,000 bales from Australia, against which has to be placed a considerable decrease expected from the River Plate, plus an expected but quite uncertain shortfall in the Domestic clip of the United States of America, so that the quantities should remain just about "as-you-were."

*Our Local Market.*—The first lots of new season's wools available have all been offered by tender—this principle having been decided on by the wool buyers, until the commencement of the regular public auctions which reopen on 8th October.

Many of the wools so far to hand proved seedy and burry, and we fear this may be a characteristic of this season's wools. Wools being really free from this fault will be in good demand. Early arrivals are also earthy. Nevertheless, high prices have been paid, as buyers are always keen to get a few early lots as a trial.

Wools shorn after the rain will be cleaner and lighter, and, if packed real dry, will command keen competition. Farmers and traders must not forget however, that sheep which are allowed to run for a few weeks after the rain, before being shorn, will throw a heavier fleece, owing to the yolky, fatty matter rising in the wool. Such wool, however, being greasier and heavier will consequently be less valuable, and this must be taken into account and due allowance made.

We quote provisionally as follows:—

| | | | |
|---|---|---|---|
| Transkeis—good, clean, light lots | 7¾d. | to | 8¼d. |
| Transkeis—average lots | 7¼d. | „ | 7¾d. |
| Basutos—good-average lots | 6¾d. | „ | 7¼d. |
| Basutos—earthy, heavier | 6½d. | „ | 6¾d. |
| Superior short Kaffrarian farmers | 8d. | „ | 9½d. |
| Superior long Kaffrarian farmers | 8d. | „ | 11d. |

| | |
|---|---|
| Superior short well-conditioned grassveld | 6d. to 8d. |
| Superior long well-conditioned grassveld | 6d. „ 8½d. |
| Short faulty grease | 5d. „ 7d. |
| Coarse and coloured grease, good-average | 6d. „ 6½d. |
| Coarse and coloured grease, very kempy, inferior | 4d. „ 5d. |

*Mohair.*—The European market remains unchanged and very quiet, business being still badly hampered by the mohair sorters' strike, which has now been going on for many months. Once that is settled the ultimate prospects of the article seem more favourable. Presumably on the strength of this, some speculative buyers have been operating in native hair at levels which will require a considerable rise to bring them out if present London quotations are taken as any guide. We quote:—

| | |
|---|---|
| Very best long blue mohair, free from kemp | 13d. to 13½d. |
| Good long blue mohair, slightly kempy | 12d. „ 12½d. |
| Superior Herschel mohair | 12d. „ 12¼d. |
| Superior Basuto mohair | 11¾d. „ 12d. |
| Average Basuto mohair | 9½d. „ 10d. |
| Coarse and coloured mohair | 5½d. „ 6d. |
| Best winter hair | 10½d. „ 11d. |
| Average winter hair | 9½d. „ 10d. |
| Genuine winter kids | 13d. „ 14d. |

*Sundry Produce.*—All the lines under this heading have risen considerably during the month under review, and our quotations at foot are correspondingly higher than in our last issue. We quote:—

| | | | |
|---|---|---|---|
| Sundried hides | 13d. to 13¼d. | Goatskins | 12½d. |
| Dry-salted hides | 12d. „ 12¼d. | Angora skins | 8½d. |
| Sheepskins—1st quality | 6¾d. | Bastards | 10½d. |
| „ C. and C. skins | 5¾d. „ 6¼d. | Damaged | 6d. each. |
| „ Transkeis | 5d. „ 5¼d. | Horns, according to quality and size | 2d. to 3d. |
| „ Pelts | 4½d. | | |

## DURBAN.

Messrs. Reid & Acutt's Wool Mart, Ltd., Esplanade, Durban, report as follows under date 29th September, 1913:—

*Wool.*—We have another very quiet month to chronicle here, practically nothing having been done in the trade. The new clip has not yet begun to move in any quantity, but the members of the market. both buyers and sellers, are now here in full strength, and within the next week or two it is anticipated that everyone will be fully occupied.

In the absence of representative offerings, it is yet rather early to prophesy how the new clip will shape, but we think we are quite safe in saying that the market will be a very good one, and that all supplies will be well taken up.

We anticipate that prices will open well up to the level of values shown at the close of the season last March, which means that to-day's quotations are actually in advance of those current when last season opened twelve months ago.

Broadly speaking, we think sellers have nothing to fear, as the general outlook is healthy.

Under-noted we again quote in detail what we think the various districts' clips should be worth on our sales; but as we have said, little or none of the new clip has yet come to hand, and as a consequence, our figures must be taken as more or less nominal.

*Mohair.*—Here again prospects are encouraging, competition having been brisk and well maintained throughout the month for all available supplies.

*Coarse and Coloured.*—There is good inquiry for this class at the prices quoted below

The following are values current here to-day:—

### NATAL AND EAST GRIQUALAND.

*Midlands.*

| | d. | | d. |
|---|---|---|---|
| Sorted clips, light and clean | 10 | to | 12 |
| Unsorted clips, light and clean | 9 | „ | 10 |
| Bellies and pieces | 5 | „ | 7½ |

*Ladysmith, Newcastle, Dundee, etc.*

| | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 8½ | to | 10 |
| 12 months' average clips, light and clean | 7½ | „ | 8½ |
| 12 months, heavy and faulty | 6½ | „ | 7¼ |
| 6 to 9 months, light and clean | 7 | „ | 8¼ |
| 6 to 9 months, heavy and faulty | 5½ | „ | 6½ |

*Utrecht and Vryheid.*

| | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 8¼ | to | 9¼ |
| 12 months' average clips, light and clean | 7 | „ | 8¼ |
| 12 months, heavy and faulty | 6 | „ | 6¾ |
| 6 to 9 months, light and clean | 6¾ | „ | 7¾ |
| 6 to 9 months, heavy and faulty | 5½ | „ | 6½ |

*East Griqualand.*

| | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 8½ | to | 9½ |
| 12 months' average clips, light and clean | 7 | „ | 8 |
| 12 months, heavy and faulty | 6½ | „ | 7¼ |
| 6 to 9 months, light and clean | 6½ | „ | 7¼ |
| 6 to 9 months, heavy and faulty | 5½ | „ | 6¼ |

TRANSVAAL.

*Volksrust, Wakkerstroom, Ermelo, Amersfoort, etc.*

| | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 8½ | to | 9½ |
| 12 months' average clips, light and clean | 7½ | „ | 8½ |
| 12 months, heavy and faulty | 6¼ | „ | 6¾ |
| 6 to 9 months, light and clean | 6½ | „ | 7½ |
| 6 to 9 months, heavy and faulty | 5½ | „ | 6¼ |

*Standerton, Bethal, Middelburg, etc.*

| | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 8 | to | 9 |
| 12 months' average clips, light and clean | 7 | „ | 8 |
| 12 months, heavy and faulty | 6 | to | 6½ |
| 6 to 9 months, light and clean | 6¼ | „ | 7½ |
| 6 to 9 months, heavy and faulty | 5¼ | „ | 5¾ |

*Heidelberg, Pretoria, Potchefstroom, Klerksdorp, Lichtenburg, etc.*

| | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 7¼ | to | 8¼ |
| 12 months' average clips, light and clean | 6½ | „ | 7½ |
| 12 months, heavy and faulty | 5½ | „ | 6 |
| 6 to 9 months, light and clean | 6 | „ | 7 |
| 6 to 9 months, heavy and faulty | 5 | „ | 5½ |

ORANGE FREE STATE.

*Harrismith, Vrede, Bethlehem, Heilbron, etc.*

| | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 8 | to | 9 |
| 12 months' average clips, light and clean | 7 | „ | 8 |
| 12 months, heavy and faulty | 6¼ | „ | 6¾ |
| 6 to 9 months, light and clean | 6¼ | „ | 7¼ |
| 6 to 9 months, heavy and faulty | 5¼ | „ | 6¼ |

*Lindley, Kroonstad, Vredefort, Parys, etc.*

| | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 7¼ | to | 8¾ |
| 12 months' average clips, light and clean | 7 | „ | 7½ |
| 12 months, heavy and faulty | 6 | „ | 6½ |
| 6 to 9 months, light and clean | 6¼ | „ | 6¾ |
| 6 to 9 months, heavy and faulty | 5¼ | „ | 6 |

*Senekal, Ficksburg, Ladybrand, Winburg, etc.*

| | d. | | d. |
|---|---|---|---|
| 12 months' sorted clips, light and clean | 7½ | to | 8¾ |
| 12 months' average clips, light and clean | 6½ | „ | 7½ |
| 12 months, heavy and faulty | 5¾ | „ | 6¾ |
| 6 to 9 months, light and clean | 5¾ | „ | 6½ |
| 6 to 9 months, heavy and faulty | 5 | „ | 5½ |

*Coarse and Coloured.*

| | d. | | d. |
|---|---|---|---|
| Free from kemps | 5½ | to | 6½ |
| Ordinary | 4½ | „ | 5½ |
| Inferior, kempy, and Persian | 1½ | „ | 4 |

BASUTOLAND AND NATIVE WOOLS.

| | d. | | d. |
|---|---|---|---|
| Superior lots, light and clean | 6 | to | 7 |
| Average lots, light and clean | 5½ | „ | 6½ |
| Average lots, heavy and wasty | 5 | „ | 5½ |
| Transkei, good | 7 | to | 8 |
| Transkei, ordinary | 6 | „ | 7 |

MOHAIR.

| | d. | | d. |
|---|---|---|---|
| Kids, good length and super quality | 13 | to | 18 |
| Long blue, super quality | 12 | „ | 13½ |
| Long blue, average | 11 | „ | 12 |
| Good winter | 9½ | to | 11½ |
| Short and mixed winter | 8½ | „ | 9½ |
| Inferior and coloured | 3 | „ | 6 |

BASUTOLAND AND NATIVE MOHAIR.

| | d. | | d. |
|---|---|---|---|
| Good length and quality | 11 | to | 12 |
| Average lots | 10 | „ | 11 |
| Inferior and short mixed | 6 | to | 8 |

## PORT ELIZABETH.

Messrs. John Daverin & Co. report as follows under date 1st October, 1913:—

*Ostrich Feathers.*—During the past month the local market has ruled weak and irregular, and the amount of business done has been much less than usual. Owing to sellers being unable to meet buyers' reduced ideas, the weekly sales have been cut short several times, in fact, in only one week out of the past five has the usual three days market been held.

The main cause of the lack of competition amongst the buyers is undoubtedly the state of the trade in America, and the very limited orders received from that quarter. Best whites and feminas, long blacks, and also spadonas generally, have declined quite ten per cent. here since the last London sales. America is the chief user of these descriptions, and until trade improves in the United States there does not appear to be much likelihood of any improvement on these lines.

The Continental trade is also rather slacker than usual, but this will doubtless recover as soon as the Balkan troubles are settled. The Home trade, as our London correspondents inform us, is normal.

The buyers on the local market who represent American and Continental Houses have been operating on a very limited scale during the past few weeks, and prices have only been kept from falling lower by the operations of speculative buyers.

A large proportion of recent offerings have consisted of unsorted farmers' pluckings, and these have sold fairly well at full current rates: but present stocks (which are fairly large) consist largely of traders' parcels with high limits attached, and these, costing higher than current market rates, are unsaleable.

The London October auctions open next week (on Monday, the 6th inst.). About £290,000 value is to be offered, and, though this is not an exceptionally heavy quantity as the London sales are going nowadays, we are informed by cable that a general decline of fully ten per cent. is expected. If the decline is no more than this, it should leave our market practically unaltered, as a ten per cent. drop has probably been fully discounted here. The only description which has suffered no decline locally consists of drabs, which have been realizing high rates up to the present, but even these have become easier during the past two weeks.

The near future of our market will therefore depend a good deal upon the results of the approaching London sales. We think it hardly likely that best wings and long blacks will show any further decline, on the contrary we hope for some improvement on these lines in the near future; but we consider it possible that present prices for common and average wings, also drabs, may not be maintained.

Owing to the recent heavy rains locally, supplies of new goods are at present very limited.

Until our market is more settled, the following quotations must be considered as more or less nominal.

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| *Primes:* | | | | | | | |
| Extra super | 16 | 0 | 0 | to | 25 | 0 | 0 |
| Good | 13 | 0 | 0 | „ | 15 | 0 | 0 |
| *Whites:* | | | | | | | |
| Good to super | 10 | 0 | 0 | „ | 12 | 10 | 0 |
| Good average | 7 | 10 | 0 | „ | 8 | 10 | 0 |
| Average | 6 | 0 | 0 | „ | 7 | 0 | 0 |
| Common and narrow | 3 | 10 | 0 | „ | 5 | 0 | 0 |
| Good broken | 7 | 0 | 0 | „ | 9 | 10 | 0 |
| Thirds | 2 | 0 | 0 | „ | 4 | 0 | 0 |
| *Fancies:* | | | | | | | |
| Good | 6 | 10 | 0 | „ | 8 | 0 | 0 |
| Ordinary | 4 | 10 | 0 | „ | 5 | 10 | 0 |
| *Feminas:* | | | | | | | |
| Super | 9 | 0 | 0 | „ | 12 | 0 | 0 |
| Good average | 6 | 10 | 0 | „ | 8 | 0 | 0 |
| Average | 4 | 0 | 0 | „ | 5 | 10 | 0 |
| Common and narrow | 2 | 5 | 0 | „ | 3 | 5 | 0 |
| Good broken | 5 | 0 | 0 | „ | 7 | 10 | 0 |
| Thirds | 1 | 10 | 0 | „ | 2 | 10 | 0 |
| *Greys:* | | | | | | | |
| Good | 6 | 0 | 0 | „ | 7 | 10 | 0 |
| Ordinary | 3 | 10 | 0 | „ | 4 | 15 | 0 |

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| *Tails:* | | | | | | | |
| Male, good, big, bold | 2 | 5 | 0 | to | 3 | 5 | 0 |
| Male, good average | 1 | 15 | 0 | „ | 2 | 0 | 0 |
| Short and narrow | 0 | 15 | 0 | „ | 1 | 0 | 0 |
| Female, light, good, big, bold | 1 | 10 | 0 | „ | 2 | 10 | 0 |
| Female, light, good average | 1 | 5 | 0 | „ | 1 | 10 | 0 |
| Female, light, short and narrow | 0 | 10 | 0 | „ | 0 | 12 | 6 |
| Female, dark, good, big, bold | 1 | 0 | 0 | „ | 1 | 15 | 0 |
| Female, dark, good average | 0 | 15 | 0 | „ | 0 | 17 | 6 |
| Female, dark, short and narrow | 0 | 7 | 6 | „ | 0 | 10 | 0 |
| *Blacks:* | | | | | | | |
| Long (special) | 4 | 0 | 0 | „ | 5 | 10 | 0 |
| Long, good | 2 | 15 | 0 | „ | 3 | 5 | 0 |
| Long, fair | 1 | 15 | 0 | „ | 2 | 5 | 0 |
| Long, drabby | 1 | 0 | 0 | „ | 2 | 5 | 0 |
| Medium | 1 | 5 | 0 | „ | 2 | 0 | 0 |
| Short | 0 | 10 | 0 | „ | 0 | 15 | 0 |
| Wiry | 0 | 3 | 0 | „ | 0 | 6 | 0 |
| Floss, long | 1 | 5 | 0 | „ | 1 | 15 | 0 |
| Floss, short | 0 | 10 | 0 | „ | 0 | 16 | 0 |

| *Drabs:* | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| Long, special | 3 | 10 | 0 | to | 4 | 10 | 0 |
| Long, good | 2 | 5 | 0 | „ | 2 | 15 | 0 |
| Long, fair | 1 | 10 | 0 | „ | 2 | 0 | 0 |
| Medium | 0 | 17 | 6 | „ | 1 | 10 | 0 |
| Short | 0 | 5 | 0 | „ | 0 | 12 | 6 |
| Wiry | 0 | 3 | 0 | „ | 0 | 6 | 0 |
| Floss, long | 1 | 5 | 0 | „ | 2 | 0 | 0 |
| Floss, short | 0 | 9 | 0 | „ | 0 | 14 | 0 |

| *Spadonas:* | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| Light (special) | 2 | 15 | 0 | to | 4 | 0 | 0 |
| Light, fair to good | 1 | 10 | 0 | „ | 2 | 0 | 0 |
| Light, narrow | 0 | 15 | 0 | „ | 1 | 5 | 0 |
| Dark | 0 | 15 | 0 | „ | 2 | 0 | 0 |
| *Chicks* | 0 | 2 | 6 | „ | 0 | 7 | 6 |

The following may be quoted as the approximate current values of unsorted parcels per line:—

| | *Whites.* | | | | | | | *Feminas.* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | £ | s. | d. | | £ | s. | d. | £ | s. | d. | | £ | s. | d. |
| Superior pluckings | 8 | 0 | 0 | to | 9 | 10 | 0 | 6 | 10 | 0 | to | 8 | 0 | 0 |
| Good average lots | 6 | 10 | 0 | „ | 7 | 5 | 0 | 5 | 0 | 0 | „ | 6 | 0 | 0 |
| Poor average lots | 5 | 5 | 0 | „ | 6 | 0 | 0 | 3 | 5 | 0 | „ | 4 | 5 | 0 |
| Common lots, stalky, narrow, and discoloured | 3 | 15 | 0 | „ | 4 | 15 | 0 | 2 | 10 | 0 | „ | 3 | 0 | 0 |

| | *Tails.* | | | | | *Blacks.* | | | | | *Drabs.* | | | | | *Spadonas.* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | s. | d. | | s. | d. | s. | d. | | s. | d. | s. | d. | | s. | d. | s. | d. | | s. | d. |
| Good | 20 | 0 | to | 30 | 0 | 20 | 0 | to | 40 | 0 | 17 | 6 | to | 30 | 0 | 35 | 0 | to | 55 | 0 |
| Average | 12 | 6 | „ | 17 | 6 | 12 | 6 | „ | 15 | 0 | 11 | 0 | „ | 15 | 0 | 27 | 6 | „ | 32 | 6 |
| Poor | 7 | 6 | „ | 10 | 0 | 7 | 6 | „ | 10 | 0 | 7 | 6 | „ | 9 | 0 | 15 | 0 | „ | 22 | 6 |

It will be understood that for special lots these quotations may be exceeded.

*Wool.*—This article is now arriving freely, all descriptions meeting with a steady demand. Light conditioned wools—both long and short—are fetching extreme prices, but buyers during the past fortnight have been showing great care in their selection of faulty wools, and these we quote ¼d. to ½d. per lb. lower than earlier in the month. Lately we have sold short to medium grown Karroos at 9½d., Kimberley medium at 9d., Bechuanaland 8⅝d., Colesberg and Edenburg 8½d., short Grassveldt 9¼d., and Midlands short to medium at 9d., 9¼d., and 9½d. Short Basuto wool is in request and we have sold several parcels during the month at 7½d. for short. Belly wool receives inquiries from the Continental buyers—we having sold at 7½d. The first catalogue of the season will be held on Friday, the 3rd proximo.

| | d. | | d. |
|---|---|---|---|
| Snow-white, extra superior | 22 | to | 23 |
| „ superior | 21 | „ | 22 |
| „ good to superior | 20 | „ | 21 |
| „ inferior faulty | 17 | „ | 19 |
| Grease, super long, well-conditioned, grassveld grown (special clips) | 10½ | „ | 11½ |
| Grease, super long, grassveld grown | 9 | „ | 9½ |
| Grease, super long, Karroo grown (special clips) | 9½ | „ | 10 |
| Grease, super long, Karroo grown | 8 | „ | 9 |
| Grease, super long, mixed veld | 7¼ | „ | 8 |
| Grease, light, faultless, medium, grassveld grown | 8¼ | „ | 9½ |
| Grease, light, faultless, medium, Karroo grown | 7½ | „ | 9 |
| Grease, light, faultless, short, Karroo grown | 7 | „ | 8 |
| Grease, short, very wasty | 5½ | „ | 6 |
| Cross-bred grease | 7¼ | „ | 8½ |
| Cross-bred scoured | 14 | to | 16 |
| Bellies, good | 6½ | „ | 7½ |
| Bellies, short and wasty | 5½ | „ | 6¼ |
| Locks and pieces | 3½ | „ | 5½ |
| Grease, coarse and coloured | 6¼ | „ | 7¼ |
| Scoured, coarse and coloured | 9 | „ | 14 |
| Basuto grease, short | 7 | „ | 7½ |
| O.F.S. grassveld grease, long and well-conditioned (special clips) | 8¼ | „ | 9 |
| O.F.S. grassveld grease, long and well-conditioned | 7 | „ | 7½ |
| O.F.S. grassveld grease, medium grown, light, with little fault | 6¼ | „ | 7 |
| O.F.S. grassveld grease, short, faulty, and wasty | 5½ | „ | 6¼ |
| O.F.S. Karroo grown, long and well-conditioned | 6¾ | „ | 7½ |
| O.F.S. medium grown, light, with little fault | 6 | „ | 7 |
| O.F.S. short, faulty, and wasty | 5½ | „ | 6 |

*Mohair.*—For the greater part of September a limited business was done, but during the past ten days business has become more general. A parcel of 70 bales Graaff-Reinet summer firsts changed hands at 13¾d., whilst 60 bales from the same district realized 13½d., and a farmer's super clip from Murraysburg district was sold at 14d. Winter hair is being sold as it comes to hand at 11¼d. to 11½d., the latter price for super lots—we having sold many consignments at 11½d. Winter kids are in demand at from 17d. to 18d.; here, also, buyers are most particular in their takings at the higher price. We have sold Graaff-Reinet and Bedford winter kids at 18d. There is a better inquiry for long blue hair of best quality; we have sold several parcels from the Transvaal and Free State at 13¾d.

The following are current values of :—

| | d. | | d. | | d. | | d. |
|---|---|---|---|---|---|---|---|
| Super summer kids | 25 | to | 26 | Seconds and grey | $8\frac{1}{2}$ | to | $9\frac{1}{2}$ |
| Good to super summer kids | 22 | „ | 24 | Thirds | 6 | „ | $7\frac{1}{2}$ |
| Mixed kids | 16 | „ | 20 | Winter kids, special clips (nominal) | 16 | „ | 18 |
| Super firsts | 13 | „ | 14 | Winter kids, good ordinary | 14 | „ | 15 |
| Mixed firsts | $12\frac{1}{2}$ | „ | $12\frac{3}{4}$ | Winter mohair | $11\frac{1}{4}$ | „ | $11\frac{1}{2}$ |
| Superfine long blue O.F.S. hair | 13 | „ | $13\frac{3}{4}$ | Basuto mohair | $11\frac{3}{4}$ | „ | $12\frac{1}{2}$ |
| Mixed O.F.S. mohair (average) | 11 | „ | 12 | Basuto mohair, grey | 8 | „ | 10 |
| Mixed O.F.S. mohair, very mixed | 10 | „ | $10\frac{1}{2}$ | | | | |

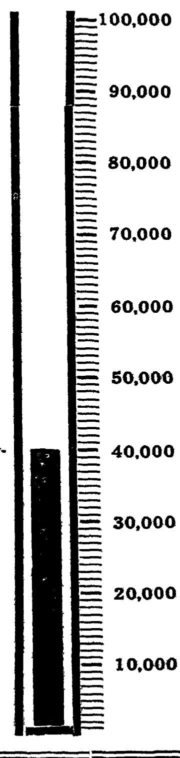
*Skins.*—The following are the prices we obtained for the several descriptions this week :—Sheepskins, $6\frac{7}{8}$d. per lb.; damaged, $5\frac{7}{8}$d. per lb. Pelts, 5d. per lb.; damaged, 4d. per lb. Hair Capes, 3s. 2d. each ; sundried, 2s. 2d. each ; cut, 1s. each ; damaged, 8d. each. Coarse wools, $6\frac{5}{8}$d. per lb.; damaged, $4\frac{1}{2}$d. per lb. Goat, 13d. per lb. ; heavy, $10\frac{1}{2}$d. per lb.; sundried, 11d. per lb. ; damaged, $6\frac{1}{2}$d. per lb. Bastards, $11\frac{3}{8}$d. per lb. ; damaged, $4\frac{3}{4}$d. per lb. Angora, $8\frac{3}{8}$d. per lb.; sundried and heavy, $7\frac{5}{8}$d. per lb. ; shorn, $6\frac{3}{4}$d. per lb. ; damaged, $4\frac{1}{4}$d. per lb. Johannesburg sheep, 5d. ; damaged sheep, $2\frac{1}{2}$d. Pelts, $2\frac{1}{4}$d. Goat, 10d. ; damaged, 5d. Angora, $6\frac{1}{2}$d. ; damaged, 2d. per lb.

A large quantity of sheepskins are being received by us in a very seedy condition. Buyers will only purchase these at the price of damaged skins.

*Hides.*—Sundried, 13d. ; damaged, 12d. ; salted, 12d. ; damaged, 11d. per lb.

*Horns.*—$3\frac{1}{2}$d. each all round.





# Current Market Rates of Agricultural Produce and Stock.

The following TABLE OF CURRENT MARKET RATES OF AGRICULTURAL PRODUCE AND LIVE STOCK on Saturday, 27th Sep., 1913, ruling at the several Centres named, is published for general information.

| Centre. | A. Wheat per 100 lb. | B. Wheat Flour per 100 lb. | C. Boer Meal per 100 lb. | D. Mealies per 100 lb. | E. Mealie Meal per 100 lb. | F. Barley per 100 lb. | G. Oats per 100 lb. | H. Oat-hay per 100 lb. | J. Lucerne Hay per 100 lb. | K. Potatoes per 100 lb. | L. Tobacco (Boer Roll) per lb. | M. Beef per lb. | N. Mutton per lb. | O. Fresh Butter per lb. | P. Eggs per dozen. | Q. Cattle (Slaughter). | R. Sheep (Slaughter). | S. Pigs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Cape Province:* | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | £ s. d. | s. d. | £ s. d. |
| Aliwal North ... | 12 6 | 22 6 | 15 6 | 7 6 | 9 0 | 8 0 | 9 6 | 7 6 | 7 6 | 9 6 | 1 0 | 0 6 | 0 5 | 2 0 | 1 3 | 10 10 0 | 15 0 | *2 10 0 |
| Beaufort West ... | 13 0 | 17 6 | 12 6 | 6 6 | 8 0 | 11 0 | 7 6 | 4 6 | 6 0 | 12 0 | 1 0 | 0 4 | †0 5½ | ‡1 4½ | 1 0 | 13 0 0 | 14 0 | 5 0 0 |
| Capetown ... | 6 6 | — | — | — | — | 8 6 | 7 0 | 4 6 | 7 0 | 12 0 | — | — | — | 1 3 | 1 0 | — | — | ‖6d. p. lb. |
| East London ... | 9 0 | 18 0 | 29 0 | 6 0 | 14 0 | 7 6 | 9 0 | 6 6 | 4 6 | 13 0 | 1 0 | 0 5 | 0 6 | 2 6 | 1 6 | 11 0 0 | 17 0 | 1 7 0 |
| Grahamstown ... | 11 9 | — | — | 7 6 | — | 8 3 | 8 3 | 7 5 | 5 9 | 12 0 | 0 9 | 0 6 | 0 6 | 2 6½ | 1 3½ | — | — | — |
| Kimberley ... | 13 0 | 15 0 | 15 0 | 6 0 | 6 3 | 9 0 | 7 6 | 6 0 | 6 0 | 12 0 | 0 6 | 0 5½ | 0 5 | 1 4 | 1 3 | 14 0 0 | 14 0 | 4d. p. lb. |
| Kingwilliamstown | 10 0 | 18 0 | 14 0 | 6 3 | 7 0 | 9 6 | 9 0 | 7 0 | 4 0 | 11 0 | 0 9 | 0 6 | 0 6 | 2 3 | 0 10 | 9 0 0 | 17 6 | 3d. l. wt. |
| Port Elizabeth ... | 10 6 | — | — | 7 0 | — | 8 0 | 8 0 | 6 0 | — | 11 6 | — | 0 7 | 0 7 | 2 0 | 1 0 | — | — | 2 10 0 |
| Queenstown ... | 11 0 | 16 6 | 14 0 | 6 6 | 10 0 | 9 0 | 9 6 | 5 6 | 6 6 | 10 0 | 0 10 | — | 0 4 | 2 6 | 1 0 | — | — | — |
| *Natal:* | | | | | | | | | | | | | | | | | | |
| Durban ... | — | — | — | 8 0 | — | — | — | — | — | 10 6 | — | 0 4 | 0 5 | 1 5 | 1 4 | — | — | — |
| Pietermaritzburg | 12 0 | — | — | 6 0 | — | 12 0 | 10 0 | 7 0 | 6 9 | 9 0 | 0 5 | 0 5½ | 0 6 | 1 7 | 1 1 | — | — | — |
| *Transvaal:* | | | | | | | | | | | | | | | | | | |
| Pretoria ... | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Johannesburg ... | 11 9 | — | — | 4 9§ | 5 0 | 9 4 | 8 0 | 6 3 | 5 6 | 14 2 | 0 3½ | — | — | 0 11 | 1 1 | — | — | — |
| *Orange Free State:* | | | | | | | | | | | | | | | | | | |
| Bloemfontein ... | 12 6 | — | 15 0 | 6 0 | 6 9 | — | 4 9 | 5 0 | 4 6 | 8 0 | 0 9 | 0 6 | — | 2 0 | 1 6 | — | — | — |
| Harrismith ... | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

* Average, £2 to £3. † Average, 4d. to 8d. ‡ Average, 1s. 3d. to 1s. 6d. § White, 5s. 6d. ‖ Average 4d. to 8d.

# The Weather.

By C. STEWART, B.Sc., Chief Meteorologist, Department of Irrigation.

THE mean air temperature over the Union during the month of August was about two degrees above the normal, both day and night temperatures having, except in a few parts, been higher than usual. A cold spell occurred in the middle of the month, but no frosts of a serious nature.

The rainfall was above the normal in the south of Cape Province, over the north of the Orange Free State, the inland districts of Natal, and all but the northern portion of the Transvaal. In other parts the deficit was slight, except along the Natal coasts. Good rains fell over the greater portion of the Transvaal and Orange Free State and the north-east of the Cape during the first week of the month: the following week heavy precipitation in the south-west of the Cape gave rise to floods and consequent damage, and during the cold spell which followed snow fell in many places. The rainfall for the year (from 1st January) shows an excess over Natal, along a belt extending from the north-east to the south-west of the Transvaal, and within the area bounded by Uniondale, Fraserburg, Britstown, Graaff-Reinet, and East London, while other parts of the Union show a deficit.

NOVEMBER WEATHER CHARACTERISTICS.

With the exception of the western and south-western coastal districts, where the rainfall is decreasing, there is a general increase in the amount of precipitation throughout the Union.

The heaviest rainfall should now be experienced in the eastern Transvaal and Swaziland, with normals of about 5·0 inches. In Zululand 4·5 inches may be expected; in Natal 4·0 inches; in Kaffraria 3·5 inches; in the south-east and Basutoland 3·0 inches; in the western Transvaal and north-east of the Cape Province and along the south-coast 2·5 inches; in the Orange Free State 2·0 inches; on the northern and east central Karoo and the Cape Peninsula 1·5 inches; and slightly over 1 inch in the remainder of the Province, excepting the western and south-western coastal districts, where less than an inch should fall. Severe thunder and hail storms may occur, more especially inland.

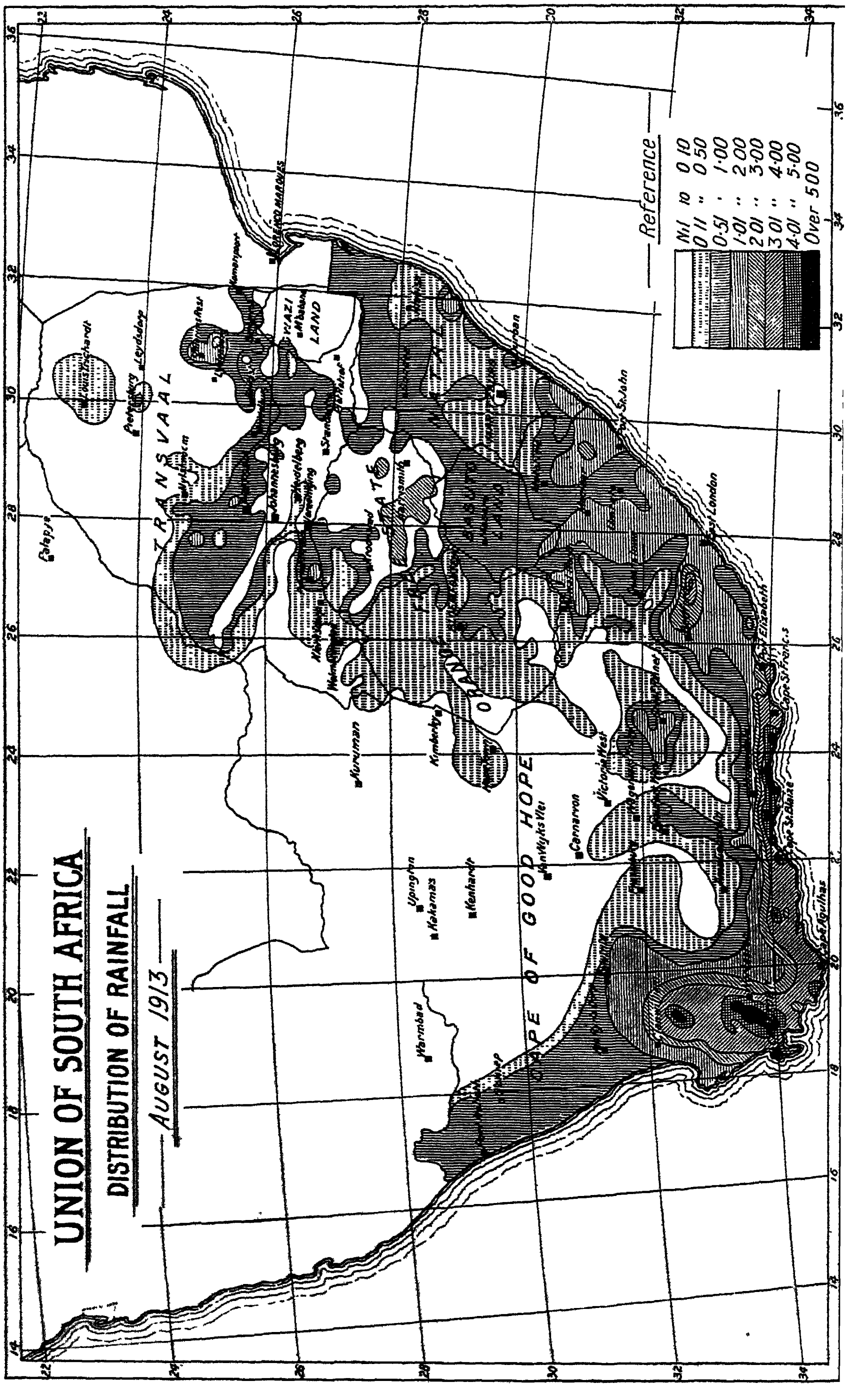
The highest mean daily temperature is now experienced over the northern borders of the Cape Province, where the normal is 72 degrees. In Natal and the eastern Transvaal a mean temperature of 71 degrees may be anticipated; and on the west central Karoo 69 degrees; on the southern Karoo 68 degrees; on the east central Karoo and in the Orange Free State 67 degrees; in the Peninsula 62 degrees, and over the remainder of the Union 65 degrees should be reached. Frosts are unlikely.

The prevailing winds are northerly over the Transvaal; south-westerly over the north, and north-easterly over the south-east of the Cape Province.

Of the total possible number of hours of bright sunshine about 84 per cent. should be enjoyed over the northern border and about 50 per cent. over the south-east of the Cape Province; about 68 per cent. over the Peninsula; and 67 per cent. over the Transvaal.

OBSERVATIONS OF TEMPERATURES (FROM SELF-REGISTERING THERMOMETERS IN THERMOMETER SCREENS)—AUGUST, 1913.

| Place. | Observer. | Month—August, 1913. Mean Max. | Mean Min. | Monthly Temperature. | Normal Monthly Temperature. | Difference from Normal. | Extremes. Highest. | Date. | Lowest. | Date. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | ° | ° | ° | ° | | ° | |
| *Transvaal*—Louis Trichardt ... | S.-Sergt. J. C. N. Clark | 76·8 | 48·3 | 62·5 | 60·0 | +2·5 | 88·0 | 13th | 37·0 | 17th. |
| Pietersburg ... ... | W. Frankleyne ... | 76·6 | 42·6 | 59·6 | 57·6 | +2·0 | 86·0 | 26th & 30th | 31·0 | 15th. |
| Zeerust ... ... | H. Dietrich, J.P. ... | 73·7 | 41·5 | 57·6 | 56·6 | +1·0 | 83·3 | 26th | 30·3 | 17th. |
| Pretoria (Arcadia) ... | J. Lyall Soutter ... | 74·3 | 40·8 | 57·6 | 56·7 | +0·9 | 83·1 | 21st | 30·2 | 17th. |
| Belfast ... ... | G. J. Imrie... ... | 65·5 | 33·7 | 49·6 | 50·0 | +0·4 | 75·0 | 24th & 25th | 18·0 | 16th. |
| Mbabane (Swaziland). | A. C. Hulett ... | 73·1 | 47·9 | 60·5 | 58·4 | +2·1 | 84·2 | 30th | 34·0 | 15th. |
| Johannesburg (Obser.) | Staff ... ... | 68·2 | 45·5 | 56·9 | 54·6 | +2·3 | 77·8 | 21st & 22nd | 27·5 | 14th. |
| Potchefstroom ... | J. R. Stenning ... | 74·1 | 41·2 | 57·7 | 54·0 | +3·7 | 83·3 | 21st | 21·2 | 11th. |
| Christiana ... ... | S. W. Davis ... | 76·5 | 40·9 | 58·7 | 54·0 | +4·7 | 86·0 | 19th & 22nd | 30·0 | 10th & 12th. |
| Komatipoort ... ... | H. J. Evans ... | 83·9 | 51·9 | 67·9 | 67·4 | +0·5 | 97·0 | 30th | 38·0 | 16th. |
| *Free State*—Bloemfontein ... ... | J. Arndt ... ... | 68·1 | 41·8 | 55·0 | 51·9 | +3·1 | 80·6 | 22nd | 27·9 | 14th. |
| Lindley ... ... | J. Oats ... ... | 66·5 | 36·6 | 51·6 | 51·0 | +0·6 | 79·0 | 22nd | 26·0 | 16th. |
| Harrismith ... ... | J. B. Patterson ... | 62·4 | 40·2 | 51·3 | 49·0 | +2·3 | 83·0 | 11th | 25·0 | 16th. |
| *Natal*—Durban ... ... | Capt. Black ... | 67·0 | 58·1 | 62·6 | — | — | 71·0 | 23rd, 26th, 27th, & 30th | 49·0 | 15th & 16th |
| Maritzburg ... ... | Govt. Asylum ... | 77·8 | 49·2 | 63·5 | 62·4 | +1·1 | 95·0 | 22nd | 30·0 | 15th & 16th. |
| Dundee ... ... | T. Kenny ... ... | 75·0 | 43·9 | 59·4 | 61·9 | —2·5 | 86·0 | 21st & 22nd | 32·0 | 13th. |
| Hlabisa ... ... | J. Swarbrick ... | 82·5 | 55·5 | 69·0 | 65·4 | +3·6 | 90·0 | 23rd | 48·0 | 13th & 16th. |
| *Cape*—Kuruman ... ... | G. Bean ... ... | 73·0 | 34·1 | 53·6 | — | — | 82·5 | 22nd | 23·0 | 10th. |
| Hopetown ... ... | — ... ... | 73·4 | 41·5 | 57·4 | 53·1 | +4·3 | 84·9 | 22nd | 28·5 | 14th. |
| Aliwal North ... ... | A. Brown ... ... | 70·7 | 37·0 | 53·8 | 50·9 | +2·9 | 83·5 | 22nd | 23·5 | 15th. |
| Kokstad ... ... | H. D. Coyte ... | 68·6 | 39·3 | 54·0 | 49·8 | +4·2 | 82·9 | 21st | 27·0 | 16th. |
| Murraysburg ... ... | A. Cameron ... | 67·4 | 40·1 | 53·7 | 48·4 | +5·3 | 82·0 | 23rd & 24th | 25·0 | 4th. |
| Queenstown ... ... | H. Holley ... ... | 69·7 | 42·9 | 56·3 | 53·4 | +2·9 | 84·0 | 21st & 22nd | 27·0 | 15th. |
| Bedford ... ... | Thos. Hall ... ... | 71·3 | 46·7 | 59·0 | 57·0 | +2·0 | 90·0 | 21st | 30·0 | 14th. |
| East London ... ... | M. C. Grogan ... | 70·2 | 53·9 | 62·0 | 60·9 | +1·1 | 95·0 | 27th | 46·0 | 15th. |
| Amalienstein ... ... | Rev. Carl Prozesky | 68·8 | 41·7 | 55·3 | 55·2 | +0·1 | 84·0 | 21st | 32·0 | 5th. |
| Weltevreden ... ... | Lionel Baker ... | 67·5 | 49·0 | 58·2 | 54·4 | +3·8 | 72·9 | 25th & 27th | 42·4 | 31st. |
| Capetown (Observatory) | The Staff ... ... | 63·8 | 50·3 | 57·0 | 55·6 | +1·4 | 71·9 | 8th | 40·7 | 2nd. |
| Wynberg ... ... | Sister Mary Imelda | 66·1 | 47·5 | 56·8 | 56·6 | +0·2 | 74·0 | 8th | 40·5 | 2nd. |
| Mossel Bay ... ... | A. Draper ... ... | 63·9 | 47·6 | 55·8 | 58·0 | —2·2 | 75·0 | 26th | 39·0 | 14th. |
| Port Elizabeth ... | P. E. Morgan ... | 66·6 | 52·0 | 59·3 | 59·3 | +0·0 | 87·0 | 26th | 44·0 | 14th & 15th. |


UNION OF SOUTH AFRICA
DISTRIBUTION OF RAINFALL
AUGUST 1913
Reference
Nil to 0·10
0·11 " 0·50
0·51 " 1·00
1·01 " 2·00
2·01 " 3·00
3·01 " 4·00
4·01 " 5·00
Over 5·00
TRANSVAAL
CAPE OF GOOD HOPE
SWAZI LAND
BASUTO LAND
Pietersburg
Leydsdorp
Kuruman
Kimberley
Carnarvon
Victoria West
Upington
Kakamas
Kenhardt
Warmbad
East London
Port Elizabeth
Port St. John
Cape St. Francis
Cape St. Blaize
Cape Agulhas
Palapye

RAINFALL RETURN FOR AUGUST, 1913.

| PLACE. | OBSERVER. | MONTH. Aug., 1913. | Normal. | Difference from Normal. | YEAR. From 1st Jan., 1913. | Normal. | Difference from Normal. |
|---|---|---|---|---|---|---|---|
| *Transvaal—* | | ins. | ins. | ins. | ins. | ins. | ins. |
| Komatipoort ... | H. J. Evans ... | 0·14 | 0·24 | -0·10 | 15·36 | 16·71 | —1·35 |
| Christiana ... | S. W. Davis ... | 0·14 | 0·12 | +0·02 | 14·57 | 12·85 | +1·82 |
| Pilgrims Rest ... | E. Elphinstone ... | 1·25 | 0·43 | +0·82 | 26·48 | 26·83 | —0·35 |
| Belfast ... ... | The Forester ... | 0·17 | 0·25 | —0·08 | 17·64 | 16·88 | +0·76 |
| Zeerust ... ... | H. Dietrich ... | 0·76 | 0·12 | +0·64 | 14·74 | 15·64 | —0·90 |
| Middelburg ... | Dr. H. A. Spencer | 0·41 | 0·31 | +0·10 | 12·86 | 15·41 | —2·55 |
| Piet Retief ... | W. A. Humphries | 1·04 | 0·68 | +0·36 | — | — | — |
| Pretoria (Arcadia) | J. Lyall Soutter... | 1·03 | 0·33 | +0·70 | 18·73 | 17·36 | +1·37 |
| Standerton ... | A. von Backstrom | 0·98 | 0·58 | +0·40 | 17·04 | 17·37 | —0·33 |
| Pietpotgietersrust | S. A. M. R. ... | 0·00 | 0·17 | —0·17 | 17·28 | 13·88 | +3·40 |
| Observatory ... | Observatory Staff | 0·91 | 0·28 | +0·63 | 13·55 | 17·18 | —3·63 |
| Louis Trichardt ... | S. A. M. R. | 0·18 | 0·23 | —0·05 | 18·43 | 18·63 | —0·20 |
| Pietersburg ... | W. Frankleyne ... | 0·00 | 0·17 | —0·17 | 14·25 | 11·54 | +2·71 |
| Rooiberg ... ... | N. H. Munro ... | 1·19 | 0·59 | +0·60 | 12·28 | 14·60 | —2·32 |
| *Swaziland—* | | | | | | | |
| Mbabane... ... | Swaziland Police | 1·14 | 0·76 | +0·38 | 29·34 | 29·42 | —0·08 |
| *Natal—* | | | | | | | |
| Maritzburg ... | Govt. Asylum ... | 0·04 | 1·14 | —1·10 | 31·78 | 17·73 | +14·05 |
| Hlabisa ... ... | J. Swarbrick ... | 0·44 | 0·65 | —0·21 | 37·05 | 22·31 | +14·74 |
| Dundee ... ... | T. Kenny ... | 0·74 | 0·40 | +0·34 | 19·33 | 16·97 | +2·36 |
| Port Shepstone ... | C. Landsberg ... | 1·02 | — | — | 31·73 | — | — |
| Durban ... ... | Capt. Black ... | 0·71 | 1·95 | —1·24 | 45·20 | 22·21 | +22·99 |
| *Cape—* | | | | | | | |
| Mafeking ... | W. Hawkins . | — | 0·03 | — | — | 13·11 | — |
| Vryburg ... | Gaoler ... | — | 0·52 | — | — | 19·86 | — |
| O'Kiep ... | J. Croffs ... | 0·98 | 0·87 | +0·11 | — | 5·65 | — |
| Pella ... | Rev. Bishop Simon | — | 0·39 | — | — | 1·86 | — |
| Upington ... | Gaoler ... ... | — | 0·09 | — | — | 5·20 | — |
| Kenhardt ... | A. E. Bowker ... | 0·00 | 0·10 | —0·10 | 2·21 | 4·43 | —2·22 |
| Griquatown ... | E. H. Hanstein ... | 0·00 | 0·29 | —0·29 | — | 10·75 | — |
| Prieska ... ... | M. Drummer ... | — | 0·18 | — | — | 7·71 | — |
| Kimberley ... | Gaoler ... | — | 0·36 | — | — | 12·21 | — |
| Hopetown ... | C. B. Scott ... | 0·12 | 0·24 | —0·12 | 8·42 | 9·91 | —1·49 |
| Garies ... | Gaoler ... | — | 0·87 | — | — | 4·25 | — |
| Clanwilliam ... | W. J. Downes ... | 2·26 | 0·98 | +1·28 | 7·88 | 6·52 | +1·36 |
| Van Rhynsdorp ... | T. J. Shaw ... | 0·75 | 0·70 | +0·05 | 4·38 | 4·87 | —0·49 |
| Calvinia ... | Gaoler ... | 0·00 | 0·82 | —0·82 | 4·83 | 6·25 | —1·42 |
| Van Wyk's Vlei... | J. R. Morkel ... | 0·00 | 0·12 | —0·12 | 4·23 | 5·06 | —0·83 |
| Fraserburg ... | P. J. Booyzen ... | 0·00 | 0·34 | —0·34 | 7·38 | 5·56 | +1·82 |
| Britstown ... | P. A. Myburgh ... | 0·00 | 0·26 | —0·26 | 8·65 | 8·36 | +0·29 |
| Carnarvon ... | J. Sullivan ... | 0·00 | 0·33 | —0·33 | 5·95 | 6·73 | —0·78 |
| Victoria West ... | N. van Rensburg | 0·00 | 0·33 | —0·33 | 9·32 | 8·08 | +1·24 |
| Murraysburg ... | A. Cameron ... | 1·09 | 0·44 | +0·65 | 7·04 | 8·64 | —1·60 |
| Philipstown ... | P.W. van Ingen-Kal | 0·00 | 0·42 | —0·42 | 9·57 | 10·43 | —0·86 |
| Hanover ... ... | B. Collette ... | 0·12 | 0·49 | —0·37 | 8·02 | 10·97 | —2·95 |
| Aliwal North ... | Gaoler ... | — | 1·01 | — | — | 17·36 | — |
| Queenstown ... | H. Holley ... | 0·58 | 0·90 | —0·32 | 15·36 | 16·21 | —0·85 |
| Kokstad ... | H. D. Coyle ... | 0·81 | 0·80 | +0·01 | 20·19 | 15·85 | +4·34 |
| Umtata ... | C. R. Hampson ... | 0·69 | 0·96 | —0·27 | 15·32 | 15·34 | —0·02 |
| Port St. Johns ... | F. Lloyd ... | — | 2·88 | — | — | 26·79 | — |
| Piquetberg ... | Gaoler ... | — | 2·49 | — | — | 14·76 | — |
| Worcester ... | W. B. Sutton ... | 2·38 | 1·40 | +0·98 | 9·91 | 7·96 | +1·95 |
| Capetown Observ. | The Staff... ... | 3·76 | 3·53 | +0·23 | 17·27 | 20·60 | —3·33 |
| Wynberg ... | Sister Mary Imelda | 7·15 | 6·07 | +0·98 | 30·82 | 32·16 | —1·34 |
| Sutherland ... | Gaoler ... | 0·00 | 0·73 | —0·73 | 5·30 | 7·44 | —2·14 |
| Amalienstein ... | Rev. Carl Prozesky | 0·80 | 0·80 | ±0·00 | 7·57 | 8·69 | —1·12 |

| PLACE. | OBSERVER. | MONTH. Aug., 1913. | MONTH. Normal | MONTH. Difference from Normal. | YEAR. From 1st Jan. 1913. | YEAR. Normal. | YEAR. Difference from Normal. |
|---|---|---|---|---|---|---|---|
| *Cape* (continued)— | | | | | | | |
| Swellendam ... | H. Montgomery... | 3·42 | 2·51 | +0·91 | 15·85 | 21·44 | —5·59 |
| Mossel Bay ... | G. Draper ... | 2·13 | 1·35 | +0·78 | 9·61 | 11·44 | —1·83 |
| Beaufort West ... | J. E. Stevens ... | 0·49 | 0·34 | +0·15 | 8·50 | 5·79 | +2·71 |
| Uniondale ... | E. J. Stewart ... | 1·66 | 1·54 | +0·12 | 11·20 | 9·80 | +1·40 |
| Knysna ... ... | C. Wilding ... | — | 2·44 | — | — | 17·65 | - - |
| Graaff-Reinet ... | J. Simpson ... | 1·26 | 0·76 | +0·50 | 12·85 | 10·63 | +2·22 |
| Steytlerville ... | P. R. de Wet ... | 0·15 | 0·51 | —0·36 | 11·32 | 5·65 | +5·67 |
| Port Elizabeth ... | P. E. Morgan ... | 3·98 | 2·01 | +1·97 | 14·67 | 12·75 | +1·92 |
| Bedford ... | T. C. Hall ... | 1·45 | 1·12 | +0·33 | 16·98 | 17·30 | —0·32 |
| East London ... | M. G. Grogan ... | 0·71 | 1·82 | —1·11 | 22·27 | 15·36 | +6·91 |
| *Orange Free State*— | | | | | | | |
| Harrismith ... | J. B. Patterson ... | 1·13 | 0·76 | +0·37 | 13·49 | 16·86 | —3·37 |
| Bloemfontein ... | J. Arndt ... ... | 0·36 | 0·48 | —0·12 | 11·54 | 15·48 | —3·94 |
| Lindley ... | J. Oates ... | 1·43 | 0·33 | +1·10 | 10·76 | 15·02 | —4·26 |

# Export of Fruit.

THE following statement shows the description and declared value of fresh fruit exported from the Union of South Africa during the month of July, 1913, distinguishing port of shipment :—

| Description. | Via Capetown. | Via Port Elizabeth. | Via East London. | Via Durban. | Via Delagoa Bay. | TOTAL. |
|---|---|---|---|---|---|---|
| | £ | £ | £ | £ | £ | £ |
| Apples ... ... ... | 102 | — | — | 5 | — | 107 |
| Apricots ... ... ... | — | — | — | — | — | — |
| Bananas ... ... ... | 27 | — | — | 43 | — | 70 |
| Grapes ... ... ... | — | — | — | — | — | — |
| Guavas ... ... ... | — | 1 | — | — | — | 1 |
| Lemons ... ... ... | 20 | — | — | 4 | — | 24 |
| Mangoes ... ... ... | 20 | — | - | — | — | 20 |
| Melons ... ... ... | — | — | — | — | — | — |
| Naartjes ... ... ... | 358 | 5 | — | 215 | — | 578 |
| Nectarines ... ... | — | — | — | — | — | — |
| Oranges ... ... ... | 2,972 | 651 | 2 | 158 | — | 3,783 |
| Paw-paws ... ... ... | — | — | — | 15 | — | 15 |
| Peaches ... ... ... | — | — | — | — | — | — |
| Pears ... ... ... | 39 | — | — | — | — | 39 |
| Pineapples ... ... | 12 | 3 | — | 60 | — | 75 |
| Plums ... ... ... | — | — | — | — | — | — |
| Other kinds ... ... | — | — | — | 25 | — | 25 |
| TOTAL ... £ | 3,500 | 660 | 2 | 525 | — | 4,737 |

# Outbreaks of Animal Diseases.

THE following outbreaks of scheduled infectious and contagious animal diseases have occurred in the areas specified during the month ended 31st September, 1913.

C. E. GRAY,
*Principal Veterinary Surgeon (Union).*

TRANSVAAL.

| DISEASE. | DISTRICT. | AREA OR NAME OF FARM. | Number of Deaths. | Number of Animals Affected. | Number of In-contacts. | Number of Animals Tested. | Number of Animals Reacted and Destroyed. | Number of Doubtful Reactors to be Retested. |
|---|---|---|---|---|---|---|---|---|
| Anthrax ... | Potchefstroom ... | Machavie ... ... ... ... ... ... ... | 1 | — | 75 | — | — | — |
| | Witwatersrand ... | Florida ... ... ... ... ... ... | 1 | — | — | — | — | — |
| | Wakkerstroom ... | Ondehoutkloof No. 296 ... ... ... ... ... | 1 | — | 150 | — | — | — |
| | " ... | Zandfontein No. 352 ... ... ... ... ... | 1 | — | 36 | — | — | — |
| | Witwatersrand ... | Geldenhuis Brickfields ... ... ... ... ... | 1 | — | 6 | — | — | — |
| | " ... | Leeuwpoort No. 4 ... ... ... ... ... | 1 | — | 23 | — | — | — |
| | Potchefstroom ... | Buffelsdoorn No. 660 ... ... ... ... ... | 4 | — | 56 | — | — | — |
| | " ... | Welgevonden No. 560 ... ... ... ... ... | 1 | — | 80 | — | — | — |
| | Pretoria ... ... | Droogefontein No. 447 ... ... ... ... ... | 5 | — | 90 | — | — | — |
| | " ... | Olievenhoutbosch No. 552 ... ... ... ... | 1 | — | — | — | — | — |
| | Potchefstroom ... | Machavie ... ... ... ... ... ... ... | 1 | — | 85 | — | — | — |
| | Witwatersrand ... | Daggafontein No. 25 ... ... ... ... ... | 1 | — | 97 | — | — | — |
| Glanders ... | Potchefstroom ... | Ventersdorp ... ... ... ... ... ... | 1 | — | — | — | 3 | — |
| | Ermelo ... ... | Mooivlei No. 56 ... ... ... ... ... ... | 1 | — | 1 | — | — | — |
| Tuberculosis ... | Krugersdorp ... | Luipaardsvlei Township ... ... ... ... ... | 1 | — | — | — | — | — |
| | " ... | Lancaster Gold Mine ... ... ... ... ... | — | — | — | — | 1 | — |
| | Middelburg ... | Anglo-French Colliery ... ... ... ... ... | 1 | — | — | 1 | — | — |

Districts in Transvaal in which East Coast Fever is prevalent:—Zoutpansberg, Carolina, Barberton, Piet Retief, Rustenburg, Lydenburg, Pretoria, and Wakkerstroom.

## ORANGE FREE STATE.

| Disease. | District. | Area or Name of Farm. | Number of Deaths. | Number of Animals Affected. | Number of In-contacts. | Number of Animals Tested. | Number of Animals Reacted and Destroyed. | Number of Doubtful Reactors to be Retested. |
|---|---|---|---|---|---|---|---|---|
| Mange | Smithfield ... ... | Erf 1, Block F, Smithfield Town ... ... ... | — | 2 | — | — | — | — |

## TRANSKEI.

| Disease. | District. | Area or Name of Farm. | Number of Deaths. | Number of Animals Affected. | Number of In-contacts. | Number of Animals Tested. | Number of Animals Reacted and Destroyed. | Number of Doubtful Reactors to be Retested. |
|---|---|---|---|---|---|---|---|---|
| East Coast Fever | Qumbu ... ... | Charlie Mgobozis Location ... ... ... ... | 7 | — | 100 | — | — | — |
| | „ ... ... | Msikelwas Location ... ... ... ... ... | 14 | — | 603 | — | — | — |
| | Mount Fletcher ... | Luzie Location ... ... ... ... ... ... | 2 | — | 781 | — | — | — |
| | Butterworth ... | Mtulus Location ... ... ... ... ... ... | 1 | — | 584 | — | — | — |
| | Tsolo ... ... | Somerville Mission ... ... ... ... ... | 12 | — | 91 | — | — | — |
| | „ ... ... | Samuels Location ... ... ... ... ... ... | 7 | — | 219 | — | — | — |
| | Mount Frere ... | Essek-Jamis 1 and 2 ... ... ... ... ... | 8 | — | 137 | — | — | — |
| | „ ... | Sihiyas Location ... ... ... ... ... ... | 10 | — | 10 | — | — | — |
| | Kentani ... ... | Youngamas and Somanas Locations ... ... ... | — | — | Unknown. | — | — | — |
| | „ ... ... | Ngamakwe Mkatshanes Locations ... ... ... | 1 | — | 20 | — | — | — |
| Glanders ... | Tabankulu ... ... | Cucadie ... ... ... ... ... ... ... | — | — | — | — | 1 | — |
| | Flagstaff ... ... | Langas Location ... ... ... ... ... ... | — | — | — | — | 3 | — |
| Lung-Sickness | Mqucnduli ... ... | Ainizulus Location ... ... ... ... ... | — | — | — | 80 | 3 | — |
| | „ ... ... | Noahs Location ... ... ... ... ... ... | — | — | — | — | 1 | — |
| | Engobo ... ... | Commonage, Engobo ... ... ... ... ... | — | — | — | — | 5 | — |
| Anthrax ... | Kentani ... ... | Simatyas and Dalvenis Locations ... ... ... | — | — | Unknown. | — | — | — |
| | Butterworth ... | Ewantsana ... ... ... ... ... ... ... | 7 | — | — | 22 | — | — |
| Mange ... ... | „ ... | Erf No. 261 ... ... ... ... ... ... | — | 1 | — | — | — | — |

CAPE PROVINCE

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Anthrax ... | Barkly West ... | H. V. No. 14, Stone Hill ... | 1 | — | Unknown. | — | — | — |
| | Knysna ... ... | Portland ... | 1 | — | „ | — | — | — |
| | Komgha ... ... | Farm No. 335 ... | 1 | — | 30 | — | — | — |
| | „ ... ... | Farm Sec. 15 xiii/34 ... | 1 | — | 31 | — | — | — |
| | „ ... ... | Commonage ... | 1 | — | 15 | — | — | — |
| | „ ... ... | Farm Sec. 17 xiii/37 ... | 1 | — | 14 | — | — | — |
| | „ ... ... | Farm Section 5 xiii/35 ... | 1 | — | 49 | — | — | — |
| | „ ... ... | Farm Section 14 xiii/37 ... | 1 | — | 10 | — | — | — |
| | Mafeking ... ... | Farm Sunnyside ... | 1 | — | 253 | — | — | — |
| | Vryburg ... ... | Farm Success ... | 1 | — | Unknown | — | — | — |
| Equine Scabies | Cape ... ... | Capetown ... | — | 2 | — | — | — | — |
| | Hay ... ... ... | Droog River, Griquatown ... | — | 2 | — | — | — | — |
| | Humansdorp ... | Hankey ... | — | 3 | — | — | — | — |
| Glanders ... | Cape ... ... | Canterbury Street, Cap town ... | — | Nil | — | — | 1 | 1 |
| | „ ... ... | Dorset Street, Capetown ... | — | 1 | — | — | 2 | 25 |
| | „ ... ... | Woodstock ... | — | 1 | — | — | Nil | Nil |
| | Oudtshoorn... ... | Paardebont ... | — | Nil | — | — | 2 | Nil |
| | Victoria East ... | Springvalley ... | — | 1 | — | — | Unknown. | — |
| Tuberculosis ... | Cape ... ... | Various ... | — | — | — | 309 | 14 | 2 |
| | Malmesbury ... | „ ... | — | — | — | 63 | 5 | Nil |
| | Paarl ... ... | „ ... | — | — | — | 6 | Nil | Nil |
| | Stellenbosch ... | „ ... | — | — | — | 23 | Nil | Nil |

## NATAL.

| Disease. | District. | Area or Name of Farm. | Number of Deaths. | Number of Animals. Affected. | Number of In-contacts. | Number of Animals Tested. | Number of Animals Reacted and De-stroyed | Number of Doubtful Reactors to be Retested. |
|---|---|---|---|---|---|---|---|---|
| Anthrax ... | Lions River ... | Windfall ... ... ... ... ... ... ... | — | — | Unknown | — | — | — |
| | " ... | Ashley Grange ... ... ... ... ... ... | 1 | — | — | — | — | — |
| | " ... | Allerton ... ... ... ... ... ... ... | 1 | — | — | — | — | — |
| | Newcastle ... ... | Highton ... ... ... ... ... ... ... | 1 | — | 295 | — | — | — |
| Mange in Equines | Richmond ... ... | Trevergie ... ... ... ... ... ... ... | — | — | 15 | — | — | — |
| Epizootic Lymphangitis | Lower Umzimkulu... | Toplands ... ... ... ... ... ... ... | — | — | 7 | — | — | — |
| East Coast Fever | Alexandra ... ... | Widenham Est. ... ... ... ... ... ... | 1 | — | 4 | — | — | — |
| | " ... ... | Forsaken ... ... ... ... ... ... ... | 1 | — | 10 | — | — | — |
| | " ... ... | Allerton ... ... ... ... ... ... ... | 2 | — | 39 | — | — | — |
| | Lower Umzimkulu... | Fairview Mission ... ... ... ... ... ... | — | — | 120 | — | — | — |
| | Alfred ... ... | Forrest Side ... ... ... ... ... ... | 1 | — | 36 | — | — | — |
| | Ngotshe ... ... | Nooitgedacht ... ... ... ... ... ... | 6 | — | 26 | — | — | — |
| | " ... ... | Wykom ... ... ... ... ... ... ... | Unknown. | — | Unknown | — | — | — |
| | " ... ... | Ngomi Forest Reserve ... ... ... ... ... | 1 | — | 12 | — | — | — |
| | " ... ... | Rietfontein... ... ... ... ... ... ... | Unknown. | — | Unknown. | — | — | — |
| | Pietermaritzburg ... | Pietermaritzburg Town Lands ... ... ... ... | 1 | — | 100 | — | — | — |
| | " ... | Star and Garter Premises ... ... ... ... | 1 | — | 9 | — | — | — |

Districts in Natal free from East Coast Fever are :—Tugela, Mapumulo, and Durban County.

# Importation of Live Stock.

RETURN showing particulars of certain Pure-Bred Live Stock recently imported into the Union of South Africa.

| Stud-book No. or Name. | Breed and Stud-book in which Registered. | Sex. | Country of Origin. | Importer's Name and Address. |
|---|---|---|---|---|
| HORSES: | | | | |
| "Peasemore" ... ... | Thoroughbred.—English Stud-book, vol. 21, page 191... | Stallion | Britain | H. F. Seale, Claremont, Capetown (2/8/13). |
| "Galloping Wolf"... ... | " " " " " 573... | " | " | H. L. du Toit, Zoutpan, Honey Nest Kloof (23/8/13). |
| "Maidenwell" ... ... | " " " " " 810... | " | " | " " " |
| "Greater Scott" ... ... | " " " " 22 ... ... | " | " | " " " |
| "Caesar Go-Bang," No. 610 | Thoroughbred.—Welsh Pony and Cob Society... ... | " | Wales | F. J. van Laer & Co., Ltd., Port Elizabeth (26/8/13). |
| Unnamed ... ... ... | Thoroughbred.—English Stud-book ... ... ... | Colt | U.K. | Harry Mundy, Aberfeldy, O.F.S. (30/8/13). |
| No. 12,249 ... ... ... | Hackney.—Hackney Horse Society ... ... ... | " | England | B. Wessels, Thorn Villa, Robertson (22/8/13). |
| "John Bull" ... ... | Hackney.—Cornwall ... ... ... ... ... ... | " | U.K. | W. McKie, Veterinary Surgeon, Bloemfontein. |
| "Frensham Rosavor" ... | " " ... ... ... ... ... | " | " | " " |
| No. 21130 ... ... ... | Hackney.—Hackney Horse Society Book, vol. 21 ... | " | U.K. | D. McNab, Brakpan (1/8/13). |
| ASSES: | | | | |
| No particulars ... ... | Catalonian.—No particulars ... ... ... ... | Jack | Spain | Woodhead, Plant, Ltd., Strand Street, Capetown (16/8/13). |
| No particulars ... ... | Donkey.—No particulars... ... ... ... ... | " | England | Cooper & Nephews, for T. J. W. Carter, Kimberley (22/8/13). |
| "Caminanto," No. 264 ... | Spanish.—Catalonian Stud-book ... ... ... | " | Spain | C. A. Pope, Molteno (29/8/13). |
| "Mosquito," No. 227 ... | " " " ... ... ... ... | " | " | " " " |
| "Rigoso," No 231... ... | " " " ... ... ... ... | " | " | " " " |
| "Calveron," No. 169 ... | " " " ... ... ... ... | " | " | " " " |
| CATTLE: | | | | |
| No. 3883 ... ... ... | Zwartbont Hollandsch-Nederlandsche Rundvee Stamboek (Register voor Jong Vee) | Cow | Holland | Sir David Graaff, Bart., Capetown (16/8/13). |
| No. 8901 ... ... ... | " " " " " ... | " | " | " " " |
| No. 3152 ... ... ... | " " " " " ... | " | " | " " " |

| Stud-book No. or Name. | Breed and Stud-book in which Registered. | Sex. | Country of Origin. | Importer's Name and Address. |
|---|---|---|---|---|
| CATTLE (*contd.*): | | | | |
| No. 3485 ... ... ... | Zwartbont Hollandsch-Nederlandsche Rundvee Stamboek (Register voor Jong Vee) | Cow | Holland | Sir David Graaff, Bart., Capetown (16/8/13) |
| No. 3117 ... ... ... | " " " " " ... | " | " | " " " |
| No. 3454 ... ... ... | " " " " " ... | " | " | " " " |
| No. 3937 ... ... ... | " " " " " ... | " | " | " " " |
| No. 3847 ... ... ... | " " " " " ... | " | " | " " " |
| No. 3050 ... ... ... | " " " " " ... | " | " | " " " |
| No. 4272 ... ... ... | " " " " " ... | " | " | " " " |
| No. 3841 ... ... ... | " " " " " ... | " | " | " " " |
| No. 3171 ... ... ... | " " " " " ... | " | " | " " " |
| No. 2966 ... ... ... | " " " " " ... | " | " | " " " |
| No. 2893 ... ... ... | " " " " " ... | " | " | " " " |
| No. 3885 ... ... ... | " " " " " ... | " | " | " " " |
| No. 3920 ... ... ... | " " " " " ... | " | " | " " " |
| No. 2820 ... ... ... | " " " " " ... | " | " | " " " |
| No. 2799 ... ... ... | " " " " " ... | " | " | " " " |
| No. 2826 ... ... ... | " " " " " ... | " | " | " " " |
| No. 3652 ... ... ... | " " " " " ... | " | " | " " " |
| No. 2983 ... ... ... | " " " " " ... | " | " | " " " |
| No. 3518 ... ... ... | " " " " " ... | " | " | " " " |
| No. 2903 ... ... ... | " " " " " ... | " | " | " " " |
| No. 3919 ... ... ... | " " " " " ... | " | " | " " " |
| No. 3986 ... ... ... | " " " " " ... | " | " | " " " |
| No. 3124 ... ... ... | " " " " " ... | " | " | " " " |
| No. 3096 ... ... ... | " " " " " ... | " | " | " " " |
| No. 3902 ... ... ... | " " " " " ... | " | " | " " " |
| No. 3602 ... ... ... | " " " " " ... | " | " | " " " |
| No. 3293 ... ... ... | " " " " " ... | " | " | " " " |
| No. 3770 ... ... ... | " " " " " ... | " | " | " " " |
| No. 4100 ... ... ... | " " " " " ... | " | " | " " " |
| No. 3612 ... ... ... | " " " " " ... | " | " | " " " |
| No. 6599 ... ... ... | Zwartbont Hollandsch-Nederlandsche Rundvee Stamboek | " | " | " " " |
| No. 5778 ... ... ... | " " " " " ... | " | " | " " " |
| No. 6597 ... ... ... | " " " " " ... | " | " | " " " |
| No. 6596 ... ... ... | " " " " " ... | " | " | " " " |

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|---|---|---|---|---|
| No. 5600 ... ... ... | Zwartbont Hollandsch-Nederlandsche Rundvee Stamboek | Cow | Holland | Sir David Graaff, Bart., Capetown (16/8/13). |
| No. 5596 ... ... ... | " " " " " ... | " | " | " " " |
| No. 5598 ... ... ... | " " " " " ... | " | " | " " " |
| No. 6546 ... ... ... | " " " " " .. | " | " | " " " |
| No. 6545 ... ... ... | " " " " " .. | " | " | " " " |
| No. 7106 ... ... ... | " " " " " ... | " | " | " " " |
| No. 7107 ... ... ... | " " " " " .. | " | " | " " " |
| No. 6533 ... ... ... | " " " " .. | " | " | " " " |
| No. 5769 ... ... ... | " " " " " ... | " | " | " " " |
| No. 6290 ... ... ... | " " " " " ... | " | " | " " " |
| No. 6291 ... ... ... | " " " " " ... | " | " | " " " |
| No. 6541 ... ... ... | " " " " " ... | " | " | " " " |
| No. 1322 ... ... ... | " " " " " ... | Bull | " | " " " |
| No. 4219 ... ... ... | Hereford.—Hereford Herd-book Society ... .. | " | " | J. Smith & Son, Val, Transvaal (29/8/13) |
| No. 4217 ... ... ... | " " " " ... ... ... | Cow | " | " " " |
| No. 4218 ... ... ... | " " " " ... ... ... | " | " | " " " |
| No. 33,500 ... ... ... | Aberdeen-Angus.—Aberdeen-Angus Cattle Society ... | " | " | " " " |
| "Aaltje," No. 17,391 ... | Friesland.—Fresian Herd-book ... ... ... ... | Heifer | " | A. A. Kingshill, Coloniesplaat, District Graaff-Reinet (15/8/13). |
| "Yanke," No. 17,466 ... | " " " ... ... ... ... | " | " | " " " |
| "Steinser XXXIII," No. 17,467 | " " " ... ... ... ... | " | " | " " " |
| "Rooske II," No. 17,469 ... | " " " ... ... ... | . | " | " " " |
| "Reinkje III," No. 18,329 | " " " ... ... ... ... | " | " | " " " |
| "Adam," No. 6328 ... | " The Hague ... ... ... ... . | . | " | J. H. le Roux, Bakenskraal, Oudtshoorn (13/8/13). |
| "Lard III" ... ... | " S. A. Stud-book ... ... ... ... | Cow | " | R. Cross, Hillside, Bolotwa (16/8/13). |
| "Wimpie III" ... ... | " " ... ... ... ... | " | " | " " " |
| "Piet" ... ... ... | " " ... ... ... ... | Bull Calf | " | " " " |
| S. No. 219/64A ... ... | " Het Friesch Rundvee Stamboek ... ... | Cow | " | P. J. Naude, Bethlehem, Orange Free State (16/8/13). |
| T/V. No. 100/50A ... ... | " " " " ... ... | " | " | Nels Rust Estate, Nels Rust (14/8/13). |
| K.M. No. 96/555A ... | " " " " ... .. | " | " | " " " |
| B. No. 117/741A ... ... | " " " " ... ... | " | " | " " " |
| B No. 37/85A ... ... | " " " " ... . | " | " | " " " |
| C./F. No. 198/67A ... ... | " " " " ... .. | " | " | " " " |
| H. No. 146/77A ... ... | " " " " ... . | " | " | " " " |
| No. 6281 ... ... ... | " " " " ... . | Bull | " | " . " |
| No. 6824 ... ... ... | " " " " ... ... | " | " | " " " |

| Stud-book No. or Name. | Breed and Stud-book in which Registered. | Sex. | Country of Origin. | Importer's Name and Address. |
|---|---|---|---|---|
| CATTLE (*contd.*): | | | | |
| No. 6326 ... ... ... | Friesland.—Het Friesch Rundvee Stamboek ... ... | Bull | Holland | Nels Rust Estate, Nels Rust (14/8/13). |
| "Spotside 3rd," No. 22,534 | Devon.—Devon Herd-book ... ... ... ... | Cow | England | J. O. Southey, Schoombie, C.P. (14/8/13). |
| "Highfield Darkie 2nd," No. 25,240 | " " " ... ... ... ... | Heifer | " | " " " |
| "Pound Fillpan 2nd," No. 23,040 | " " " ... ... ... ... | Cow | " | H. L. Southey, Steynsberg, C.P. (14/8/13). |
| "Pound Bella 4th," No. 25,356 | " " " ... ... ... ... | Heifer | " | " " " |
| "Willet Rise," No. 25,692 | " " " ... ... ... ... | " | " | Price Bros., Queenstown (30/8/13). |
| No. 4490 ... ... ... | " South Devon Herd-book Society ... ... | Bull | " | Agricultural Co-operative Union, Limited, Maritzburg (1/8/13). |
| No. 4372 ... ... ... | " " " " ... ... | " | " | " " " |
| No. 4132 ... ... ... | " " " " ... ... | " | " | " " " |
| "Pamflate Countess 4th" | " " " " ... ... | Heifer | U.K. | J. T. Foster, Ixopo (30/7/13). |
| No. 10,014 ... ... ... | " " " " ... ... | " | " | " " |
| No. 9179 ... ... ... | " " " " ... ... | " | " | " " |
| No. 10,807 ... ... ... | " " " " ... ... | " | " | " " |
| No. 4487 ... ... ... | " " " " ... ... | Bull | " | " " |
| "Conqueror," No. 4328 ... | " " " " ... ... | " | " | Bloemfontein Board of Executors (21/8/13). |
| "Bella V," No. 11,300 ... | " " " " ... ... | Heifer | " | " " " |
| "Dahlia," No. 10,806 ... | " " " " ... ... | " | " | " " " |
| "Daisy I," No. 10,580 ... | " " " " ... ... | " | " | " " " |
| "Bride 6th" ... ... | Shorthorn.—Coates Stud-book, vol. 54, page 750 ... | " | Gt. Britain | Whiley, Roderick & Co., Bloemf'nt'n (21/8/13). |
| "Marden Sunbeam" ... | " " " " " ... | Cow | " | G. G. Gluich, Paardenberg Station, Orange Free State (21/8/13). |
| "Marden Princess" ... | " " " " " ... | " | " | " " " |
| "Marden Speedy 4th" ... | " " " " " ... | " | " | " " " |
| "Marden Snap" ... ... | " " " " " ... | " | " | " " " |
| "Marden Miriam" ... | " " " " " ... | " | " | " " " |
| "Marden Cowslip" ... | " " " " " ... | " | " | A. C. Vice, Molteno, C.P. (21/8/13). |
| "Marden Snap 6th" ... | " " " " " ... | Heifer | " | " " " |
| "Marden Wild Duke 5th" | " " " " " ... | Bull | " | " " " |
| No. 115,930 ... ... | " Shorthorn Soc. of Gt. Britain and Ireland | " | U.K. | E. W. Evans, Creighton, Natal (29/8/13). |
| "Ilford Rosemary II" ... | " " " " " ... | Cow | " | " " " |
| No particulars ... ... | " " " " (vol. 57, p. 696) | Bull | " | A. R. Robartson, Zandspruit (29/7/13). |

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|---|---|---|---|---|
| "Scarlet Visier" ... ... | Shorthorn.—Shorthorn Society of Great Britain and Ireland | Bull | U.K. | Thomson & Arnott, Highflats, Natal (29/8/13). |
| No. 114,235 ... ... | " " " " " ... | " | " | Harry Mundy, Aberfeldy, Orange Free State (21/8/13). |
| No particulars (8 animals) | " Coates Herd-book ... ... ... ... | Bulls | Australia | Gayer Bros. & Cochran, Collendina, Kingswood, Transvaal (18/8/13). |
| No particulars (4 animals) | " " " ... ... ... ... | Heifers | " | " " " |
| No. 22,073 ... ... ... | " " " vol. 59 ... ... ... | Bull | U.K. | C. J. M. Kibberd, Empangeni (2/8/13). |
| No. 22,074 ... ... ... | " " " " ... ... ... | Heifer | " | " " " |
| No. 5 ... ... ... | " " " " ... ... ... | " | " | " " " |
| No particulars ... ... | " " " " ... ... ... | " | " | " " " |
| "Camelia 15th," No. 22,175 | " " " " ... ... ... | " | Ireland | Vivian D. Mackay, Woodlands, Hankey (26/8/13). |
| "Burton Ruby Spot 10th" | " 19th Herd-book of the Lincolnshire Red Shorthorn Association | " | England | A. H. Weeks, Sandflats, C.P. (26/8/13). |
| "Strubby Violet 2nd" ... | " No particulars ... ... ... ... | " | " | " " " |
| SHEEP: | | | | |
| No particulars (2 animals) | No particulars ... ... ... ... ... ... | Rams | Germany | — Gregory, Swinbourne (18/8/13). |
| No particulars (5 animals) | " ... ... ... ... ... ... | Ewes | " | " " " |
| No particulars (3 animals) | " ... ... ... ... ... ... | Rams | " | Utrecht Trading Company, Utrecht (18/8/13). |
| No particulars (4 animals) | " ... ... ... ... ... ... | Ewes | " | " " " |
| PIGS: | | | | |
| "Sanfoin" ... ... ... | Berkshire.—British Berkshire Society ... ... ... | Boar | U.K. | S. Mitchell Innes, Elandslaagte (28/8/13). |
| "Naughty Girl" ... ... | " " " " ... ... ... | Sow | " | " " " |

# Departmental Notices.

## TOBACCO SEED.

The Tobacco and Cotton Division has a quantity of selected and acclimatized tobacco seed of heavy and bright types for distribution during 1913. All applications for seed must be sent to the Chief of the Tobacco and Cotton Division, P.O. Box 516, Pretoria, accompanied by postal orders to cover cost of same.

This seed will be distributed pro ratio at a charge of 1s. per oz.

*Turkish Tobacco Seed:* The following varieties of Turkish seed can be obtained from the Officer in Charge of Turkish Tobacco Experiments, Stellenbosch, Cape Province, at the prices quoted, viz.:—

| | |
|---|---|
| Soulook | 4s. per oz. |
| Malcadje | 4s. „ |
| Baladovari | 4s. „ |
| Dubeck | 5s. „ |

W. H. SCHERFFIUS,
*Chief of Tobacco and Cotton Division.*

## CLEANING AND GRADING TOBACCO SEED.

The Tobacco and Cotton Division, Union Department of Agriculture, Pretoria, are prepared to clean and grade tobacco seed sent to them by farmers free of charge.

The process separates the light from the heavy seed, and the result is that a much larger percentage of the cleaned seed will germinate.

W. H. SCHERFFIUS,
*Chief of Tobacco and Cotton Division.*

## COTTON SEED.

Selected seed of several varieties of American Upland Cotton can be obtained from the Tobacco and Cotton Division, Union Department of Agriculture, Pretoria, at a charge of 3d. per lb.

In every case a remittance must accompany the order for seed.

W. H. SCHERFFIUS,
*Chief of Tobacco and Cotton Division.*

## VETERINARY RESEARCH LABORATORY, ONDERSTEPOORT.

### ADMISSION OF VISITORS.

It is hereby notified for the information of the public that visitors cannot be admitted to the Veterinary Research Laboratory at Onderstepoort during working hours on weekdays unless a special permit has previously been obtained from the Secretary for Agriculture.

The most convenient time for visitors to be shown over the Laboratory is Sunday afternoon, when an officer will be specially detailed for the purpose and permits will not be required.

## PIGS FOR SALE.

Large White, Yorkshire, and Berkshire Pigs are for sale from the Tweespruit Stud Farm, P.O. Tweespruit, and Large Blacks and Berkshires from the Roodepoort Stud Farm, P.O. Dewetsdorp. Inquiries should be addressed to the Managers of the farms mentioned.

Pedigreed Large Black pigs, farrowed 17th March, 1913, are for sale from the School of Agriculture, Grootfontein, Middelburg, Cape Province.

Inquiries should be addressed to the Principal.

## GOVERNMENT WINE FARM, GROOT CONSTANTIA.

### VISITORS' DAYS.

It is notified by the Secretary for Agriculture that it has been decided that persons shall be allowed to visit the Government Wine Farm at Groot Constantia between the hours of 9 a.m. and 5 p.m. on Mondays, Tuesdays, and Thursdays.

## CHANGE OF QUARTERS.

It is hereby notified that the following Divisions of the Department of Agriculture (including Head Office) are now quartered in the Union Buildings:—Union Veterinary Division (with exception of Permit Office), Sheep Division, Division of Dairying, Division of Horticulture, Chief Inspector of Grain, Division of Brands and Fencing, Division of Publications, Division of Household Science, and Library.

The Divisions of Plant Pathology, Botany, and Entomology are situated in Wessels Street and Nel Street, respectively, Arcadia, and the Divisions of Tobacco and Cotton, Chemistry, and Co-operation remain in town for the present. The offices of the Senior Veterinary Surgeon for the Transvaal are also situated in town.

## SCHOOLS OF AGRICULTURE.

### AREAS OF OPERATION.

It is hereby notified that the following are the areas of operation of the various Schools of Agriculture, and that inquiries dealing with agricultural subjects should be addressed to the Principal of the School which serves the locality in respect of which the inquiry is made:—

*School of Agriculture, Cedara.*—The whole of the Natal Province and Griqualand East.

*School of Agriculture, Grootfontein, Middelburg, Cape.*—That portion of the Cape Province lying south of the Orange River (excluding the area served by the School of Agriculture, Elsenburg), and the Transkerian Territories (excluding Griqualand East).

*School of Agriculture, Elsenburg.*—The coastal districts from Namaqualand to Knysna, and the Districts of Ceres, Worcester, Robertson, Swellendam, Paarl, Tulbagh, George, and Montagu.

*School of Agriculture, Glen, near Bloemfontein.*—The whole of the Orange Free State, that portion of the Cape Province lying north of the Orange River, and British Bechuanaland.

*School of Agriculture, Potchefstroom.*—The whole of the Transvaal Province.

ALEX. HOLM,
*Under-Secretary for Agriculture.*

## SALE OF POULTRY AND EGGS.

Pure bred poultry, of different breeds, also sittings of eggs are obtainable from the Schools of Agriculture, Potchefstroom, Transvaal; Elsenburg, Mulders Vlei, and Grootfontein, Middelburg, Cape. All particulars should be obtained from the principals.

PRICES.

*Poultry.*—5s. to 25s., according to age and quality.

*Eggs.*—10s. 6d. per dozen (poultry); 10s. 6d. to 20s. per dozen (turkeys and geese).

It should be understood that the poultry is essentially utility. No attempt is made to breed or sell prize poultry. Orders must be accompanied by remittance.

## TESTING OF MILK AND CREAM SAMPLES.

The testing of samples of milk and cream for butter-fat will be undertaken by the Department of Agriculture at the places mentioned hereunder.

Farmers desirous of having milk or cream tests made should—according to the locality of their farms—communicate with the following officers:—

*Cape Province (Western).*—Principal, School of Agriculture, Elsenburg, Mulders Vlei.

*Cape Province (Eastern).*—Principal, School of Agriculture, Grootfontein, Middelburg, Cape.

*Transvaal.*—Principal, School of Agriculture, Potchefstroom, and Superintendent of Dairying, Pretoria.

*Natal.*—Principal, School of Agriculture, Cedara.

*Orange Free State.*—Pending the establishment of an Agricultural School in the Orange Free State, samples from farms south of Bloemfontein should be sent to the Principal, School of Agriculture, Grootfontein, Middelburg, Cape, and from farms north of Bloemfontein to Potchefstroom or Pretoria as stated above.

### FEES.

The charge for testing is 6d. per sample of milk or cream, but if ten or more samples are forwarded by the same owner in one consignment a reduction of 25 per cent. on the charge will be made. Payment must be made when the samples are forwarded, either by postal order or by cheque. Postal or railage charges must be prepaid by the sender.

### INSTRUCTIONS FOR TAKING SAMPLES.

*Milk (mixed).*—In taking a sample of mixed milk from a number of cows, the milk must be poured from one vessel to another several times, and the sample must be taken immediately before the milk is allowed to settle. If the sample is made up from mixed milk from several vessels, it should contain the quantity from each vessel which will ensure that the completed sample is an average of the whole bulk. The stirring of the milk is in each case not sufficient.

*One cow.*—The cow must be stripped thoroughly, the milk strained and well mixed by pouring from one vessel to another several times, and the sample must be taken immediately after, before the milk is allowed to settle.

*Cream* samples should be prepared by stirring thoroughly and by pouring the cream from one vessel to another several times, and the sample must be taken immediately after.

(NOTE.—If it is desired to take composite samples of milk or cream application should be made for full information and instructions, which will then be given.)

*Bottles.*—The sample bottles should contain about ¼ pint of milk or cream. They must be thoroughly cleaned, and each sample must be labelled with the name of the owner; if it is taken from the mixed milk of a herd it must be marked "mixed." In the case of samples of individual cows each sample must, in addition to giving the name of the owner, be marked with the name, number, or other identification mark of the particular cow. Particulars of the breed of the cow or herd must also be stated. If in the case of samples of mixed milk the animals are not all pure bred, the particulars should be given as "cross-bred" or "mixed breeding." Labels will be supplied on application. Care should be taken to have the bottles well corked and sealed before dispatch.

*Preservatives.*—To each sample bottle of milk should be added four to six drops of formalin (not more) and to each cream sample five grains of powdered potassium bichromate, or just as much as can be carried on a threepenny piece.

In offering these facilities it is desired to place farmers in the position of being able to determine the butter-fat content of the milk of their herds and the percentage of butter-fat in the cream, to check the working of the separator by testing samples of the separated milk, and, lastly, to encourage the keeping of milk and butter-fat records. In the latter instance, samples should be submitted at regular intervals, either fortnightly or monthly. For any further particulars or information inquiries should be addressed to the Principals or Superintendent of Dairying, as indicated above.

The result of these tests may only be used by the owner of the samples for his private purposes, and must not be made use of in the case of any dispute or legal action between contracting parties.

ALEX. HOLM,
*Under-Secretary for Agriculture.*

## ORGANIZATION OF DEPARTMENT OF AGRICULTURE.

Administrative Office ... ... Pretoria.
Telegraph Address ... ... "Landbouw, Pretoria."

Secretary for Agriculture: F. B. Smith. Under-Secretaries for Agriculture: P. J. du Toit and A. Holm. Deputy-Accounting Officer: J. Collie. Chief Clerk: G. N. Williams. Officer in Charge of Inquiry Office, Capetown: G. W. Klerck.

### VETERINARY DIVISION.

This Division endeavours to prevent the introduction of contagious diseases of live stock into the Union and to eradicate such as are already present, and to protect live stock against enzootic diseases by inoculation and other means. So far as it is able to do so

without interfering with its other duties, the Division advises and assists farmers upon diseases of stock generally and endeavours to enlighten them upon veterinary hygiene and the care of live stock. For veterinary purposes the Union is divided into five areas, each in charge of Senior Veterinary Officers, who are responsible for the control of disease within these areas.

Principal Veterinary Officer : C. E. Gray. Assistant Principal Veterinary Officer : J. D. Borthwick.

*Cape Province.*—Senior Veterinary Surgeon : R. W. Dixon, Government Offices, Parliament Street, Capetown. Government Veterinary Surgeons : A. Goodall, Capetown; W. Jowett, Capetown; E. Fern, Capetown ; R. P. Jones, East London ; J. H. L. Lyons, East London ; W. P. Hamlyn, East London ; A. Mathew, Elliot ; W. A. Simson, Cradock ; W. Jones, Uitenhage; J. Nichol, Kingwilliamstown ; W. G. Pakeman, Queenstown ; J. P. L. Goemans, Vryburg.

*Transvaal.*—Senior Veterinary Surgeon : J. M. Christy, Department of Agriculture, Pretoria. Government Veterinary Surgeons : R. S. Garraway, Pretoria ; W. G. Evans, Box 80, Volksrust ; P. Conacher, Box 877, Johannesburg ; J. I. Edgar, Pietersburg ; G. May, Box 151, Rustenburg ; H. M. Webb, Carolina ; G. C. Webster, Box 94, Barberton ; J. Chalmers, Box 31, Ermelo ; J. M. Tate, Standerton ; J. G. Bush, Box 83, Krugersdorp ; G. Lee, Box 93, Middelburg ; T. M. Dale, Box 230, Potchefstroom ; F. Dunning, Box 53, Lydenburg ; G. McCall, Box 15, Nylstroom ; D. B. J. McCall, Box 51, Zeerust.

*Natal.*—Senior Veterinary Surgeon : W. M. Power, Colonial Buildings, Pietermaritzburg. Government Veterinary Surgeons : S. H. Ewing, Eshowe ; A. F. Harber, Box 39, Point, Durban ; S. I. Johnston, Mooi River ; F. J. Hill, Ladysmith ; A. Goule, Maritzburg ; J. L. Webb, Bulwer ; C. Tyler, Port Shepstone ; and F. Hutchinson, Dundee.

*Orange Free State.*—Acting Senior Veterinary Surgeon : G. W. Freer, Government Buildings, Bloemfontein. Government Veterinary Surgeons : J. F. Joyce, Ficksburg ; J. R. R. Hamilton, Bloemfontein ; F. M. Skues, Bethle em ; C. H. Wadlow, Smithfield ; and C. T. Clemow, Frankfort.

*Transkeian Territories.*—Senior Veterinary Surgeon : J. Spreull, Umtata. Government Veterinary Surgeons : A. M. Howie, c/o S.V.S., Umtata ; A. C. Kirkpatrick, T. M. Doyle, W. A. Dykins, J. J. G. Keppel, G. T. Henderson, and J. A. Worsley, Umtata.

### DIVISION OF VETERINARY RESEARCH.

The duty of this Division is the investigation diseases of live stock with a view to discovering methods of eradicating them or of protecting animals against them. It examines and reports upon pathological specimens forwarded by the Veterinary Division and farmers and prepares vaccines and sera of various kinds, and also mallein, tuberculin, and other diagnostic and preventive agents.

Opportunities are offered to post-graduate students for the carrying out of specia investigations and a great deal of educational work is performed by the Division.

The Division is in close touch with and is complementary to the Veterinary Division. Director of Veterinary Research : Dr. A. Theiler. Assistant Director of Veterinary Research : W. Robertson. Superintendent : E. Parkes. Professional Assistants : D. T. Mitchell, W. H. Andrews, D. Kehoe, F. Veglia, W. Jowett, G. N. Hall, G. A. H. Bedford, A. W Shilston (Pietermaritzburg), and J. Walker (Grahamstown).

### DIVISION OF SHEEP.

This office is charged with :—(*a*) Eradication of scab ; (*b*) improvement of pastora ndustries ; (*c*) the management of the Stud Sheep Farm at Ermelo ; (*d*) the improvement of the flocks maintained on the various Experimental Farms ; and (*e*) the control of the Field Cornets in the Transvaal Province.

Chief of Division : B. G. L. Enslin. Principal Sheep Inspector : A. G. Davison. Principal Sheep and Wool Expert : Charles Mallinson.

For the better carrying out of the work in connection with scab, the Union is divided into twenty-four areas in charge of Senior Sheep Inspectors ; these areas are in turn divided into 297 inspection districts, each in charge of an Inspector. In addition there are ten Inspectors employed on the railway lines for the prevention of the movement of infected stock by rail. There are also five whole-time Inspectors employed on certain large commonages.

A similar organization is adopted in respect of the improvement of sheep and wool.

*Orange Free State Province.*—Sheep and Wool Expert : J. F. McNab, Bloemfontein. Assistant Sheep and Wool Expert : A. V. M. Suter, Bloemfontein.

*Cape Province.*—Sheep and Wool Expert : W. M. McKee, Queenstown. Assistant Sheep and Wool Experts : E. V. Goddefroy, Worcester ; P. S. Taylor, Steynsburg.

*Transvaal Province.*—Western District Assistant Sheep and Wool Expert : A. M. Spies, Headquarters not yet fixed. Eastern District Assistant Sheep and Wool Expert J. J. McCall, Cedara, Natal.

*Natal Province.*—Assistant Sheep and Wool Expert: J. J. McCall, Cedara, Natal This area includes the East Griqualand District of the Cape Province.

Manager, Ermelo Stud Sheep Farm: A. G. Michaelian.

### DIVISION OF ENTOMOLOGY.

This Division obtains and disseminates information relative to beneficial and injurious "insects." In collaboration with the Division of Plant Pathology, it administers the law relating to the introduction of plants into the Union and by the inspection of nurseries and other methods, it endeavours to control injurious "insects" present in the Union; it is also responsible for the destruction of locusts.

Chief of Division: C. P. Lounsbury. Entomologists: Claude Fuller and C. P. v. d. Merwe, Pretoria; C. W. Malley, Capetown; ............................, Bloemfontein; and C. B. Hardenberg, New Hanover, Natal (investigating wattle insects).

### DIVISION OF PLANT PATHOLOGY AND MYCOLOGY.

This Division in engaged in the investigation and control of diseases of plants, produced by fungous and physiological causes, and the study and collection of fungi of economic importance. The Division is also concerned with the investigation of the merits of indigenous plants of economic importance and of poisonous plants and noxious weeds, the identification of plants, the introduction and testing of economic plants from abroad and the improvement of farm crops by breeding.

Chief of Division: I. B. Pole Evans. Director, Natal Herbarium: J. Medley Wood. Professional Assistants: Miss E. M. Doidge, P. A. v. d. Byl, Miss A. Bottomley, and Miss M. Franks. Herbarium Assistant: Miss C. Stent.

### DIVISION OF TOBACCO AND COTTON.

The object of this Division is the promotion of the tobacco and cotton industries Experiments are conducted in the breeding and growth of tobacco and cotton and in the curing, fermentation, and preparation of tobacco for the market. Approved varieties of tobacco and cotton seed are distributed amongst farmers and advice given to them personally and by correspondence and publications.

Chief of Division: W. M. Scherffius. Tobacco Warehouse Expert: T. E. Elgin. Expert for Turkish tobacco, Western Province, Cape: L. M. Stella, "La Motte," Paarl. Manager, Experiment Station, Rustenburg: H. W. Taylor. Manager, Experiment Station, Barberton: W. B. Wilson. Manager, Tzaneen Estate: E. H. F. Powell. Manager, Experiment Station, Piet Retief: R. Falgate. Manager, Cotton Experiment Station, East London: D. D. Brown.

### DIVISION OF DAIRYING.

This Division deals with all matters connected with the advancement of dairying. The Division also controls the Cold Stores at Vryburg.

Superintendent of Dairying: E. O. Challis. Senior Inspector: E. G. Hardy. Instructors: *Cape Province:* C. Schmolke, Queenstown. *Orange Free State.*—W. Oosterlaak. Government Buildings, Bloemfontein. *Natal.*—......................., Colonial Office, Pietermaritzburg. *Transvaal.*—L. J. Veenstra and E. G. Zahn, Department of Agriculture, Pretoria.

### DIVISION OF HORTICULTURE.

This Division advises farmers on the growing and marketing of fruit, including table grapes and raisin drying, and grades fruit for export.

Chief of Division: R. A. Davis. Horticulturist in charge of Experiment Station, Warmbaths: C. A. Simmonds. Horticulturist in charge of Experiment Station, Ermelo: R. le Sueur. Instructor in Horticulture, Cape Province: S. W. van Nickerk, Bovenvallei, Wellington.

### DIVISION OF VITICULTURE.

This Division is charged with the duty of advising farmers in all matters relating to the culture of the vine (excluding table grapes and raisin-making) and the manufacture of wine and brandy, and vinegar. It conducts field investigations into the suitability of various stocks, the use of fertilizers, modes of cultivation, etc., and investigates the diseases of the vine, and conducts both cellar and laboratory experiments in the making of wine and brandy. It examines pathological specimens and furnishes reports thereon, and examines chemically and bacteriologically specimens of the products above mentioned with a view to furnishing advice thereon to farmers.

This Division also includes the Government Wine Farm, Groot Constantia, where advice can be obtained by residents in the Wynberg and Hout Bay areas.

Government Viticulturist: A. I. Perold, Œnological Station, Paarl, Cape Province. Manager, Government Wine Farm, Groot Constantia: T. L. Watermeyer.

### OFFICE OF GUANO ISLANDS.

This office undertakes the conservation, collection, shipment, and sale to the public of the guano, seal skins, etc., obtained on the various islands belonging to the Union, and is charged with the administration of all matters connected therewith.

Superintendent: W. R. R. Zeederberg, 69 Strand Street, Capetown.

### DIVISION OF CO-OPERATION.

This Division is engaged in promoting co-operation for the sale and purchase of agricultural products and necessities amongst farmers and in organizing and supervising co-operative societies.

Chief Inspector: C. H. Keet. Inspectors: J. Retief and H. Minnaar.

### DIVISION OF CHEMISTRY.

This Division investigates problems of general or special importance, and for the present undertakes the analysis of soils, manures, and foodstuffs for farmers in the Transvaal, the analysis of similar matters in the other Provinces being undertaken in the laboratories of the Department of the Interior at Capetown, Grahamstown, Cedara, and Bloemfontein, pending the enlargement of the chemical laboratories at the agricultural schools and experiment stations.

The analyses are conducted solely for the enlightenment of the farmers and not for legal purposes.

Chemist: H. J. Vipond. Laboratory Assistant: L. Bischoff.

### DIVISION OF FENCING AND BRANDS.

This Division administers the laws relating to fencing and brands, and publishes the Brands Directory, required by the Transvaal Act.

Controller of Fencing and Registrar of Brands: W. J. Nussey.

### OFFICE OF HOUSEHOLD SCIENCE.

The duties of this office are to promote the study of household science by means of lectures, demonstrations, and correspondence.

Lecturer and Instructor: Miss J. C. van Duyn.

### DIVISION OF DRY-LAND FARMING.

This Division conducts experiments and disseminates information on dry-land farming. An Experiment Station is maintained at Lichtenburg, with subsidiary ones at Pretoria, Warmbaths, and Pietersburg. Experiments in dry-farming are also conducted at the agricultural schools and experiment stations, and at other centres.

Dry-land Agronomist and Manager, Experiment Station, Lichtenburg: H. S. du Toit.

### DIVISION OF GRAIN INSPECTION.

This Division undertakes the grading of grain at the ports prior to export, and, if requested to do so, determines the amount of moisture present in grain intended for export.

Chief Inspector of Grain: G. F. Nussey. Government graders are stationed at the docks at Capetown, Port Elizabeth, East London, and Durban.

### DIVISION OF PUBLICATIONS.

This Division edits the *Agricultural Journal* and other departmental publications.

Editor: Dr. W. Macdonald.

### LIBRARY.

The object of the Library is to provide as complete a collection of agricultural literature as possible for the purpose of reference.

Librarian: P. Ribbink.

### AGRICULTURAL SCHOOLS AND EXPERIMENT STATIONS.

The duties of these institutions are to provide complete courses of education extending over a period of two years and shorter courses of a technical character for persons actually engaged in farming; to instruct farmers in the area served by them on matters relating to the various phases of farming by means of personal visits, lectures, demonstrations, and correspondence; to conduct experiments, to analyse soils, manures, dairy products, etc., and to identify plants and insects and test seeds. A certain amount of pure-bred stock and of new and approved varieties of seeds are produced on the farms and disposed of to the public.

The institutions do not undertake the administration of laws relating to agriculture.

*Elsenburg School of Agriculture and Experiment Station.*—Station: Mulders Vlei; distance, 1½ miles.

Principal... ... ... ... ... ... ... ... Dr. A. I. Perold.
Lecturer in Veterinary Science ... ... ... ... R. Paine.

| | |
|---|---|
| Lecturer in Horticulture | I. Tribolet. |
| „ Viticulture and Wine-making | S. W. van Niekerk. |
| „ Chemistry | D. C. Crawford. |
| „ Engineering | N. H. Chandler. |
| „ Botany and Plant Breeding | J. H. Neethling. |
| „ Dairying | J. Allison. |
| „ Agriculture and Stock, Agricultural Economics, and Book-keeping | P. Fowlie. |
| „ Geology | The Principal. |
| „ Entomology and Zoology | Dr. Goddard and H. O. S. Reinecke. |
| „ Poultry | W. O. John. |
| „ Carpentry | N. Johnstone. |
| „ Mechanics | A. Ware. |
| Farm Manager | C. J. Starke. |
| Stockman | G. W. Johnston. |

Sub-stations at Malmesbury (E. A. Darvall, Manager), and Robertson (W. H. Fouche, Acting Manager).

*Grootfontein School of Agriculture and Experiment Station.*—Station: Middelburg, Cape Province; distance, 2 miles.

| | |
|---|---|
| Principal | R. W. Thornton. |
| Lecturer in Agriculture | G. J. Bosman. |
| „ Veterinary Science | J. A. Robinson. |
| „ Engineering | J. Lees. |
| „ Chemistry | Vacant. |
| „ „ (Assistant) | M. Lundie. |
| „ Zoology and Entomology | R. O. Wahl. |
| „ Dairying | J. Anderson. |
| „ Sheep and Goats | E. N. S. Warren. |
| „ Poultry | A. Little. |
| „ Horticulture | H. B. Terry. |
| „ Farm Manager | C. P. van der Merwe. |

Agricultural Assistants: J. Meldal Johnson, Humansdorp; A. E. Mills and W. J. Lamont, Grootfontein; and H. A. Melle, Vryburg.

*Cedara School of Agriculture and Experiment Station.*—Station: Cedara, on farm; sub-station at Winklespruit.

| | |
|---|---|
| Principal | E. Harrison. |
| Vice-Principal and Lecturer in Agriculture | J. Fisher. |
| Lecturer in Chemistry | C. Williams. |
| „ Veterinary Science | F. J. Carless. |
| „ Dairying and Poultry | A. Laurence. |
| „ Horticulture | C. B. Parsons. |
| „ Engineering | P. B. Aird. |
| „ Botany and Forestry | E. Baker. |
| Farm Manager | A. Ireland. |

*Potchefstroom School of Agriculture and Experiment Station.*—Station: Potchefstroom; distance, 1½ miles.

| | |
|---|---|
| Principal | E. J. Macmillan. |
| Vice-Principal | H. Thompson. |
| Lecturer in Chemistry | T. G. Reinecke. |
| „ „ (Assistant) | C. Douglas-Golding. |
| „ Botany | T. O. Bell. |
| „ Zoology and Entomology | Vacant. |
| „ Veterinary Science | J. R. Quinlan. |
| „ Engineering | W. S. H. Cleghorne. |
| „ Poultry | R. Bourlay. |
| „ Horticulture | W. Sturm. |
| „ Dairying | J. B. Fisher. |
| „ Agriculture | A. M. Bosman. |
| Farm Manager | P. A. Hayman. |

### STUD FARMS.

At these farms pure-bred animals, mainly horses, are maintained and bred for lease and sale to farmers.

*Standerton Stud Farm.*—Station: Standerton; distance, 11 miles. General Manager: A. McNae.

*Tweespruit Stud Farm.*—Station: Tweespruit, on farm. Manager: J. J. Morton.

# UNION DEPARTMENT OF AGRICULTURE.

## Schools of Agriculture at Cedara, Natal ; Elsenburg, Cape ; Grootfontein, Middelburg, Cape ; Potchefstroom, Transvaal.

# Courses in the Practice and Science of Agriculture.

The ordinary course of two years is essentially one which gives a sound practical as well as technical training to the young farmer.

An optional third year's course can be taken for special study in certain subjects.

Upon completion of the ordinary course the student is granted, after satisfactory examination, either the "Diploma" of the Institution (the higher award) or a "Certificate in Agriculture."

At the close of the optional additional course, a due standard of proficiency attained in the subjects chosen entitles the student to receive the special "Honours Diploma."

The course begins in January of each year. Students are not admitted at any other time, and applications will be dealt with in order of their receipt.

The fees, which are payable quarterly in advance, are £50 per annum, inclusive of board, laundry, and ordinary medical attendance.

The following are the conditions governing admission to the course beginning in January, 1914 :—

(1) Candidates must be over 16 years of age.

(2) Candidates will, if accepted, be required to undertake to complete the course of two years.

(3) Candidates must furnish with their application

(*a*) proof that they have passed at least the 7th standard of an elementary school or its equivalent ;

(*b*) evidence of good moral character and sound health.

Students are advised to attend the school situated on the farm where the farming conditions approximate most closely to those that obtain where the student is likely to farm on completion of his course of instruction.

Horticulture, Poultry Husbandry, Dairying, Cropping, and Stock Farming generally are taught at all the institutions. Special features of the courses at the different institutions are as follows :—

*Elsenburg.*—Horticulture, Viticulture and Winemaking, Cereals, and Tobacco (Turkish).

*Cedara.*—Sub-tropical Agriculture, Forestry (including Wattle-growing), Cattle, and Maize.

*Grootfontein.*—Agriculture (including Irrigation under Karoo conditions), Ostriches, Merino Sheep, Angora Goats.

*Potchefstroom:* Agriculture representative of high veld conditions, Cultivation of crops under irrigation and otherwise, Cattle, Maize and other cereals.

For further particulars inquiries should be addressed to the Principals of the Schools, to whom applications for admission should be submitted on forms which will be supplied on request

ALEX. HOLM,
*Under-Secretary for Agriculture.*

UNION OF SOUTH AFRICA.

DEPARTMENT OF AGRICULTURE.

# UNRESERVED SALE BY PUBLIC AUCTION

OF

# PURE-BRED STOCK

(BRED AT THE GOVERNMENT STUD FARM, ERMELO)

AT THE

# ERMELO STUD FARM

ON

## WEDNESDAY, 22ND OCTOBER, 1913,

COMMENCING AT 2 P.M.

Comprising:—

1 Friesland Bull, aged 2 years. 2 Friesland Bulls, aged 15 months.
3 Aberdeen-Angus Bulls.

These bulls have recently been subjected to the tuberculin test, and have not reacted.

4 Wanganella Stud Rams.
16 „ Selected Flock Rams.
7 „ Flock Rams.
8 Tasmanian Stud Rams.
17 „ Selected Flock Rams.
12 Tasmanian Flock Rams.
9 Wanganella Rambouillet Rams, bred at the Government Stud Farm, Standerton.
4 Suffolk Rams, bred at the Government Stud Farm, Standerton.

A number of Wanganella and Tasmanian ewes will also be offered for sale, of which particulars will be given on the day of sale.

Unless the Interprovincial Stock Regulations are amended by the 22nd October, cattle from Ermelo will be allowed to enter the Orange Free State. In the case of the Cape and Natal Provinces cattle may be moved to approved farms only, provided a permit for such movement has been obtained from the Principal Veterinary Officer, Pretoria, or by a person authorized by him to grant same.

Sales of cattle to Cape and Natal buyers will not be made unless buyers produce the necessary permit at the time of purchase.

The farm will be open for inspection on the morning of the day of sale.

The South African Railways have kindly consented to grant excursion facilities, that is, return tickets at single fares will be issued to persons attending the sale. Passengers are required to reach Ermelo on the 21st and 22nd October, and to complete the return journey by midnight on the 27th October. Passengers when booking are requested to ask Station Masters for excursion tickets.

Catalogues may be had on application to the General Manager of the Stud Sheep Farm, Ermelo.

F. B. SMITH,
*Secretary for Agriculture.*

Union Department of Agriculture,
Pretoria.

UNION OF SOUTH AFRICA.—DEPARTMENT OF AGRICULTURE.

# THE ANNUAL UNRESERVED SALE OF PURE-BRED STOCK

BY PUBLIC AUCTION WILL BE HELD AT THE

## GOVERNMENT EXPERIMENTAL FARM, POTCHEFSTROOM,

***on WEDNESDAY, the 12th NOVEMBER, 1913.***

**Pigs and Poultry at 11 a.m. Horses, Donkeys, Cattle, Sheep, and Goats at 1.30 p.m.**

The following Stock will be offered :—

**HORSES and DONKEYS: 6 Thoroughbred Colts; 3 Clydesdale Stallions; 7 Catalonian Jacks.**

**CATTLE: About 30 Bulls of the following breeds: Fries, Red Lincoln, Shorthorn (Coates), Ayrshire, Hereford, Sussex, and Afrikander.**

**SHEEP: About 12 Merino Rams (Tasmanian, Rambouillet, and Wanganella); 16 Suffolk Down Rams.**

**GOATS: About 18 Angora Rams.**

**PIGS: About 50 Boars and Sows of the Large Black and Berkshire Breeds.**

**POULTRY: A number of Pure-bred Poultry.**

**THE STOCK.**

The sale is the ninth of its kind arising out of the importation of pure-bred stock by the Transvaal and Union Governments. The greatest care was taken in selecting the imported animals from the best and most representative herds and flocks of each breed, and the stock now offered for sale can be recommended to breeders. The thoroughbred colts were bred at the Stud Farm, Standerton, and are the progeny of imported parents. They are of good quality and up to size, with bone and substance, and are calculated to breed good riding and driving horses. The Clydesdale stallions are recommended for the breeding of animals suitable for draught purposes. The Catalonian Jacks were bred at the Stud Farm, Standerton, and are out of imported mares.

The breeds of cattle offered for sale may be classified as follows :—

| *Breeds.* | *Suitable for.* | *Breeds.* | *Suitable for.* |
|---|---|---|---|
| Red Lincoln Shorthorn ... | Dual purposes. | Fries... ... | Dairy purposes. |
| Shorthorn (Coates) ... | | Ayrshire ... | |
| Hereford ... ... ... | Beef and trek purposes. | | |
| Sussex ... ... ... | | | |
| Afrikander ... ... | | | |

No animals are offered that are known to be suffering from any disease or impediment.

All the bulls offered for sale have recently been submitted to the tuberculin test, and have not reacted. The Potchefstroom bred bulls have been bred on "redwater" veld. The bulls bred at the Stud Farm, Standerton, have been immunized against redwater, gall-sickness, and blackquarter (sponziekte).

The sheep are the progeny of "Stud Flocks" at the Ermelo and Standerton Government Farms.

The goats are pure-bred Angoras bred from parents which were bought from the well-known pure flocks of Messrs. F. C. Bayly, R. C. Holmes, Cawood Bros., and Chas. Lee.

The pigs are all bred at Potchefstroom from high-class pedigreed boars and sows, and are of the two breeds, Large Black and Berkshire, which have proved to be the most suited to the high veld conditions of South Africa.

The Poultry will consist of a selection of pure-bred birds of different breeds.

Farmers and stockbreeders only, owning or occupying land within the Union of South Africa, may purchase any of the animals offered at this sale, and by such purchase they shall be deemed to have undertaken not to export any of the said animals therefrom within two years after the date of purchase.

Unless the Interprovincial Stock Regulations are amended by the 12th November, cattle from Potchefstroom will be allowed to enter the Orange Free State. In the case of the Cape and Natal Provinces, cattle may be moved to approved farms only, provided a permit for such movement has been obtained from the Principal Veterinary Officer, Pretoria, or by a person authorized by him to grant same. Sales of cattle to Cape and Natal buyers will not be made unless buyers produce the necessary permit at the time of purchase.

Horses, donkeys, sheep, goats, and pigs will be allowed to enter the Cape, Natal, and Orange Free State Provinces.

REDUCED RAILWAY FARES.—General excursion bookings, all classes, will be in operation from any station on the South African Railways at single fare for return journey.

For catalogue and all further particulars apply to the Principal, Experimental Farm, Potchefstroom.

ALEX. HOLM,
*Under-Secretary for Agriculture.*

Union Department of Agriculture,
Pretoria.

UNION OF SOUTH AFRICA.—DEPARTMENT OF AGRICULTURE.

# UNRESERVED SALE by PUBLIC AUCTION of PURE-BRED STOCK

## AT THE GOVERNMENT STUD FARM, TWEESPRUIT, ORANGE FREE STATE,

***AT 1 p m. ON 30th OCTOBER, 1913.***

**Auctioneer: Mr. G. J. van Riet, P.O. Box 21, Thaba 'Nchu, Orange Free State.**

**Horses and Donkey:** 2 Thoroughbred Colts and 1 Gelding, 1 Oldenburg Colt, 2 Clydesdale Colts, 1 Catalonian "Jack," and 1 Hunter Filly.

**Cattle:** 22 Bulls of the following breeds: Fries, Red Lincoln, Shorthorn, South Devon, and North Devon.

**Sheep:** Merinos (Wanganella): 30 Rams, 22 Ram Lambs, 61 Ewe Lambs; and (Tasmanian): 12 Rams.

This sale is the ninth of its kind arising out of the importation of pure-bred stock by the Orange Free State and Union Governments. The greatest care was taken in selecting the imported animals from the best and most representative studs, herds, and flocks of each breed.

The thoroughbred colts are of good quality and up to size, with bone and substance, and are calculated to breed good riding and driving horses.

The Clydesdale colts are recommended for the breeding of animals suitable for draught purposes.

The Catalonian "Jack" was bred at the Grootvlei Experiment Farm, and is from imported parents.

The cattle offered for sale are Red Lincoln, Shorthorn. and South Devon, suitable for dual purposes; North Devon, suitable for beef purposes; and Fries, suitable for dairy purposes.

No animals are offered that are known to be suffering from any disease or impediment.

All the bulls offered for sale have recently been submitted to the tuberculin test and have not reacted.

The sheep are mostly bred at the Roodepoort and Grootvlei Farms.

Farmers and stockbreeders only, owning or occupying land within the Union of South Africa, may purchase any of the animals offered at the sale, and by such purchase they shall be deemed to have undertaken not to export any of the said animals therefrom within two years after the date of purchase. All stock purchased at this sale will be entered, free of charge, in the South African Stud Book as transferred to the purchaser, and all animals sold will be consigned, carriage paid, to the buyer's nearest railway station.

Unless the Interprovincial Stock Regulations are altered before the sale, *cattle* from Tweespruit will be allowed to enter the Cape Province. In the case of the Natal and Transvaal Provinces, cattle may be moved to approved farms only, provided a permit for such movement has been obtained from the Principal Veterinary Surgeon, Pretoria, or by a person authorized by him to grant same.

Horses, donkeys, and sheep will be allowed to enter the Cape, Natal, and Transvaal Provinces.

REDUCED RAILWAY FARES.

General excursion bookings (all classes) will be in operation from any station on the South African Railways at single fare for return journey. A special train will be run after the arrival of the up and down main line trains, to leave Bloemfontein at 8.30 a.m. on the 30th October, reaching Tweespruit at about 10.40 a.m., and returning therefrom to Bloemfontein at a convenient time after the conclusion of the sale.

For catalogue and all further information apply to the Manager, Government Stud Farm, Tweespruit, Orange Free State.

ALEX. HOLM,
*Under-Secretary for Agriculture.*

Union Department of Agriculture,
Pretoria.

# The Agricultural Journal

OF THE UNION OF SOUTH AFRICA.

Vol. VI. NOVEMBER, 1913. No. 5.

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*Advertising* inquiries should be addressed to the Metropolitan Advertising Co., Box 962, Capetown.

## Editorial Notes.

**The Farmers' Tour.**

In resuming the editorial chair after an absence of six months in England, the writer desires to express his indebtedness to his assistant, Mr. H. J. Choles, for the able manner in which the *Agricultural Journal* has been conducted, to his colleagues for their valued articles, and to the farming community in general for their kindly and critical interest in the pages of this periodical. In a vacation crowded with topics touching on the agricultural industry, it is a little difficult to choose the most important subject for discussion, but we venture to think that we shall not go far wrong if we begin with that matter which has elicited widespread interest, namely, the Agricultural Tour for South African Farmers. We shall, therefore, republish the salient points of the letter from Sir Owen Philipps on behalf of the Union-Castle Company, which appeared in the daily Press of South Africa on 2nd October, 1913, and which embodied the terms of the offer to provide free return passages to England next year for fifty farmers. It runs as follows:—

"It is proposed that the agricultural associations of each of the four Provinces of the Union, viz., Cape, Transvaal, Orange Free State, and Natal, and Rhodesia shall, through its executive committee, select ten farmers, who shall represent different districts in the Province, no district sending more than one representative, working farmers only to be eligible for selection, whose principal means of subsistence is obtained from agriculture, and who are not in the employment of the Government; and I think the object in view would be furthered if preference were given to farmers who have not visited England before, or at least not within recent years. It is desirable that the farmers who are participating in this tour shall be chosen by the association by 1st January, 1914, in order that time may be given for those selected to make the necessary arrangements for their absence.

"Beyond these simple conditions, I leave the matter of selection entirely in the hands of the agricultural associations, in whose discretion I have every confidence, and who will, I am sure, fully realize to how great an extent the benefits to be derived from the tour must depend on the men who constitute the party. I am also extremely anxious that the method of choice should meet with general approval and satisfaction. The farmers will travel as the guests of the Union-Castle Line, first class, by mail or intermediate steamer, provided they leave South Africa in the first week in June, 1914, and leave the United Kingdom homeward bound on or before 30th August. Any member of the tour who may wish to travel at any other time must pay full tariff rates, and any members of their families accompanying them should pay full fares.

"In this latter connection I think I ought to make it clear that the committee's arrangements for the agricultural tour of Great Britain will be definitely based upon the exact number of farmers who are to come over, viz., fifty, and cannot in any case be made to include those who may accompany them to England.

"It is hoped that the farmers who participate in this tour will on their return do all in their power to communicate the benefit of their experience to their neighbours and others in their respective districts, say, by means of local discussion, a few lectures, or otherwise.

"There is another point which should be mentioned, viz., the tour in Great Britain is of necessity strictly limited to the fifty farmers, and cannot be made to include their relatives who may accompany them to England. The arrangements of the committee have been made definitely on this basis, and it will be quite impracticable under any circumstances to augment the party."

The above letter is merely an amplification of Sir Owen's original statement at the South African Banquet in London, with the exception that in this final communication he has omitted clause 4, which reads:

"One half of the delegates selected shall be Dutch or of Dutch extraction. (But this shall not apply to Rhodesia.)"

It was his opinion, upon further consideration, that the omission of this clause would facilitate the choice of the delegates and the selection of the best and most representative men, irrespective of nationality, more especially as all the agriculturists of this country now come under the comprehensive term of South African farmers. There is another matter to which we think it right to allude. In a letter dated 30th July, 1913, Mr. H. Wilson Fox, who represents Rhodesia on the committee of the tour, wrote to the honorary secretary as follows:—

"On further consideration, we have decided that, so far as Rhodesia is concerned, the best way of selecting the ten farmers is to appoint a small committee for the purpose. We propose that it should consist of the Acting Administrator, Mr. Newton; the Secretary for Agriculture, Dr. Nobbs; and one other member to be nominated by the Agricultural Union."

Mr. Wilson Fox was then on the point of leaving for Norway, and requested the honorary secretary to the tour to communicate, if necessary, with his co-directors, Mr. Birchenough or Colonel Baring. Accordingly, the honorary secretary called on Mr. Birchenough and pointed out that in accordance with Sir Owen Philipps' memorandum

the Union delegates were to be chosen by the Executive Committee of the Agricultural Unions of the four Provinces. But that if the British South Africa Company still adhered to the decision laid down in Mr. Wilson Fox's letter it might at least be well to enlarge the Selection Committee to a total of five members, and to appoint three farmers in place of one. To this suggestion Mr. Birchenough readily agreed. The honorary secretary has nothing to do with the selection of the delegates, but so many letters are coming to him asking for advice on this matter that he may be allowed to offer a single remark. It would greatly facilitate matters if the Executive Committees of the four Provinces were to meet together and to elect their respective presidents as the first members of the fifty farmers to be selected. Their presidents, for the time being, at least, have been chosen by themselves to be the five best and most representative agriculturists in South Africa. If this were done it would mean that the five presidents of the Agricultural Unions could be immediately appointed as members of an Executive Committee of the South African Agricultural Tour. This committee, with the President of the Agricultural Tour (Mr. J. A. Neser, M.L.A.) as chairman, might then act as an Advisory Comittee, should such a body be desired.

It may now be of interest to sketch the progress of the movement which has culminated in this South African Agricultural Tour, taken from the valuable presidential address recently delivered by Mr. J. A. Neser at the fourth annual meeting of the Dry-Farming Congress held in Johannesburg on the 5th and 6th November.

**British Agricultural Tours.**

Modern agricultural education may be said to fall into three clearly marked sections: (1) The Department of Agriculture; (2) the College of Agriculture; and (3) the Agricultural Tour. Now, the first two branches are perfectly familiar to the agriculturist of this country, but the third has still to be projected. Nevertheless, I believe that the Agricultural Tour is destined, in the near future, to become an established practice in the rural policy, not only of South Africa, but of all progressive nations.

Agricultural tours are not uncommon. For example, not long ago a party of English agriculturists visited Hungary, and in 1904 the Secretary for Scotland, the Right Honourable John Sinclair, M.P. for Forfarshire, now Lord Pentland, organized a commission of Scottish farmers and agricultural experts—thirty-five in all—to visit Denmark. The results of their investigations were published in a valuable report on the rural education, peasant proprietorship, dairying, and co-operation of that country. The following paragraph taken from the introduction to the report is worthy of our attention. It runs as follows: "Printed accounts, however painstaking and vivid, must always be less educative than personal observation. The agriculturist who is in the mind to borrow from Denmark's experience wants to see Denmark himself. Impressed by what had come under his eyes during a visit to the little State, Captain John Sinclair, Member of Parliament for Forfarshire, conceived the idea of organizing a party from his own constituents to study, with the facts and the practice before them, the root causes of Danish agricultural success. The idea grew. What was a Forfarshire project developed

into a project based upon a larger area of interests. The Secretary for Scotland was good enough to agree that a member of the Congested Districts Board and Crofters Commission should be invited to join the party. Members of Parliament of both political connections contributed suggestions and aid in the composition of the commission." The report issued by this commission (published by William Blackwood & Sons, London) consists of 152 pages, with numerous illustrations, and is most instructive reading. Still more recently another body of farmers, also from Scotland, visited the Canadian North-West; and three years ago the Scottish Agricultural Commission, consisting of a party of twelve agriculturists, journeyed to Australia at the invitation of the Government for the purpose of studying and reporting upon the rural conditions of the Commonwealth. It is worth noting that of this party of twelve delegates eleven had been engaged in a similar work in Canada (1908), seven had visited Ireland on a like mission (1906), and four were members of the group which investigated the agricultural conditions of Denmark (1904). These reports have enjoyed a wide publicity, and have done much to disseminate useful and helpful knowledge regarding the agricultural practice of the countries visited.

In passing I would call your attention to two facts which seem to me of special significance. The Scottish agriculturist has always been held in high repute both in his own country and abroad. And to me it is no wonder when I consider the spartan-like severity of his early training and his life-long consuming thirst for knowledge. And I believe that the progress and prosperity of the South African farmer must depend, in like manner, not merely upon industry, but also upon education in every branch of his profession. In South Africa already we have excellent facilities for the education of our young farmers in the admirable schools of agriculture which have been established throughout the Union, but it behoves us to do much more for the education of the adult farmer than has been done in the past.

**Boer Agricultural Tour.**

It will be remembered that shortly after the declaration of peace, Lord Milner, then High Commissioner for South Africa, conceived the idea that it would be of the greatest educational value if the farmers of the Transvaal and the Orange Free State could see for themselves the vastness and the richness of the agricultural resources of the other British Colonies. Accordingly, he arranged to send a party of Boer delegates on an agricultural tour through England, Canada, Australia, and New Zealand to study and report upon the different methods of agriculture and stock farming. Moreover, it was resolved to select the members of this commission from amongst the prisoners of war at St. Helena. It thus happened that Mr. W. L. Jooste, Mr. J. Moody Lane, both of Klerksdorp, and Mr. Swartz, of Bethlehem, Orange Free State, were chosen and accepted. At the last moment Mr. Swartz was unable to go, and Mr. H. T. Rood, of Ermelo, was chosen in his place. Captain Kirkpatrick, D.S.O., of the South African Constabulary, was appointed to command the party as the representative of the Imperial Government. Two of the delegates and Captain Kirkpatrick were accompanied by their wives. The party was absent for nine months and travelled 42,000 miles.

On the return of the Boer agricultural delegates Dr. Macdonald was asked to prepare their report. It was done, and the record of the tour was published under the name of "Agriculture within the Empire," which was widely circulated in both English and Dutch, and favourably received by the country at large. But to my mind the tour was not an unqualified success, for the following reasons: At that time the country was too unsettled, the party was too small, no agricultural experts were attached to the delegation, the time spent in travelling was too long, on the return of the delegates no lectures were given, no meetings held, and nothing further was done to awaken and sustain the public interest in the results and conclusions derived from the journey. Notwithstanding these things, I do not doubt that this tour did much to awaken in the minds of many a keen desire to know something more of the agricultural practice of other countries, as well as to strengthen the bonds of brotherhood and of citizenship throughout the different Colonies of the Empire.

It should not be forgotten that from time to time there have been a few farmers, more particularly from the Cape, who have travelled widely at their own cost, and on their return home have, with a true sense of patriotism, delivered valuable addresses on their agricultural travels. Such a name which should receive honourable mention in this connection is that of Mr. L. P. Michau, who now occupies the dual position of both president of the South African Agricultural Union and president of the Cape Agricultural Union. In the year 1893 Mr. Michau travelled extensively over the United States and Europe, and his experiences of twenty years ago are still profitable and instructive reading. But no farmers, so far as I am aware, in the annals of ancient or modern agriculture, ever undertook a tour of such magnitude as South African agriculturists have now in view. Nevertheless, the germ of the idea may be traced to the interest awakened by the Boer agricultural tour. Three years ago our secretary began to quietly plan a South African farmers' tour. But it is doubtful if anything could have been accomplished on a large and practical scale had not Sir Owen Philipps and his great and progressive steamship company stepped forward with the splendid gift of fifty free first class return passages. I am sure, gentlemen, that you would wish me, as president of the tour, on behalf of this congress, and in the name of all sections of the farming community of South Africa, to convey to Sir Owen Philipps and the Union-Castle Company our hearty thanks for their generous and far-sighted donation to this great educational movement for the benefit of the rural population.

As most of you are aware, the delegates are to be chosen by the executive committees of the Agricultural Unions. Accordingly, these committees have had placed upon them an important duty, as well as a somewhat serious responsibility. They are to select without fear or favour the ten most representative farmers from their respective Provinces in accordance with the few simple conditions laid down in Sir Owen Philipps' recent communication. In their discretion, I am certain, this congress has entire confidence, and we shall all await their decision with much interest.

**Subjects of Study.**

I now venture to submit to you the field of study and investigation which, in my opinion, the South African Agricultural Commission should cover. It will naturally embrace a large number of subjects

vital to the farmer and to his business, such as all matters relating to practical and scientific farming, agricultural policy, and agricultural legislation. Mention may be made of some of the more important: State and national aid to agriculture, agricultural education, land settlement, national and provincial departments of agriculture, experiment stations, live stock, cattle ranching, mixed farming, fruit farming, irrigation, dry-farming, steam cultivation, motor tractors, manufacture and prices of agricultural machinery, agricultural tariffs, agricultural rates on railways, farm telephones and parcel posts, markets, shipment and packing, abattoirs, citrus industry, sheep farming, swine farming, dairying, poultry farming, creameries and cheese factories, maize industry, wheat industry, cotton industry, tobacco industry, ostrich industry, wine industry, sugar industry, commercial fertilizers, pure seed trains, farmers' institutes, travelling libraries, agricultural shows, agricultural statistics, co-operation regulations for control of animal and plant diseases, etc.

**Plan of Tour.**

So far arrangements have been successfully completed for a tour in Great Britain and Holland. But our original plan was also to include the United States and Canada. To return to South Africa without seeing America would, I am convinced, deprive our party of the most valuable part of the whole tour. The agricultural industry of the United States is in many respects almost identical with the agricultural industry of South Africa. I need only mention maize and oranges to emphasize this point. The cultivation of these two crops has been brought to the highest pitch of perfection; in the first case in the State of Iowa, and in the second case in the State of California. Both may be said to have no place in the ordinary farm practice of England and Holland. Up till the present moment this great tour has been made possible by voluntary aid. Not a penny has come from the Government of the Union. I do think, however, that I voice the sentiment, not only of this congress, but of the entire farming population of South Africa, when I appeal to the Government to come forward on the £1 for £1 principle and aid this valuable educational tour. For the sum of £5000 it would be possible for our delegates to cross the Atlantic Ocean and spend three weeks in Canada and one whole month in the United States in the investigation of the agricultural conditions of these two great countries.

In connection with the trip to Holland I would like to express our indebtedness to Mr. W. H. Poultney, Secretary for the Witwatersrand Agricultural Society, and to Dr. Bisschop, Standing Counsel to the Dutch Legation in London, for the time and trouble they so kindly took in successfully interesting the Dutch authorities in the proposed tour.

The farmer of South Africa is indeed fortunate in his seasons. Not only does his climate, being the reverse of that of Europe, permit of his products being placed on the London market at a time when other countries have nothing; but, happily, the winter months in South Africa—June, July, and August—are those in which our own farmers are least busy, while this is precisely the time when the agricultural operations in both Europe and America can best be observed, viz., in their summer months or growing season. Some

of the members of the Dry-Farming Congress, one hundred in number, took part last year in a most instructive and interesting agricultural tour through the Free State. Owing to stress of work the Executive Committee have not been able to arrange for a similar tour through the Transvaal at the close of the present session. But it is their intention to make the Annual Provincial Agricultural Tour a prominent feature of our programme in the future.

**Advantages of the Tour.**

In such an assembly it is not necessary for me to dwell upon the immense advantages which will assuredly follow in the wake of our projected oversea tour. It will speed forward the development of the whole continent, for in every Province there will be at least ten men who have seen with their own eyes the live stock of England, the small-holdings of Holland, the orchards of California, and the wheat fields of Canada.

Again, it is to be hoped, that, at no distant date, farmers' institutes—similar to those already established in the United States and Canada—will be started all over South Africa; and for these and like organizations no better lecturers could be obtained than those farmers who are familiar with the agricultural conditions of their own country, and who, at the same time, are able to tell their fellow-farmers what they themselves have seen across the sea. Nor can it be doubted that a great and an increased demand will arise for our agricultural products in consequence of the widespread interest which naturally will be taken in this the first South African Agricultural Tour. With the advent of Union a vast and a sunlit land of priceless wealth has been unfurled before us. How shall we make the wilderness rejoice and the desert blossom as the rose? Such has been the witching problem of the agricultural pioneer since the daybreak of the world. Such is our clear task to-day.

**Agriculture at Oxford.**

In our recent vacation tour in rural England it was with Oxford that we began our investigations, where we were courteously received by Dr. William Somerville, Sibthorpian Professor of Rural Economy. Dr. Somerville, who is a Scotsman, hails from the Upper Ward of Lanarkshire, and was born not far from the village of Biggar. He has had a wide agricultural experience, having been for some time Lecturer on Forestry in the University of Edinburgh, then Professor of Agriculture and Forestry in the University of Durham, then Professor of Agricultural and Forestry in the University of Cambridge, then appointed as Assistant Secretary in Charge of the Intelligence Division of the Board of Agriculture in London; finally, he was elected in the year 1906 Professor of Rural Economy in the University of Oxford.

It was but natural that we should inquire as to the origin of the agricultural movement in Oxford. Agricultural teaching was begun in this renowned seat of learning in 1796, when a Professorship in Rural Economy was founded. This was the second Chair of Agriculture to be started in the British Isles, the first having been established in the University of Edinburgh four years before. Another

forward movement was made in the year 1804 by Professor Sibthorp, who was then Professor of Botany in the University of Oxford. He is best remembered by his "Flora of Greece"—a work in six volumes. He left in his will a provision for the endowment of a Chair of Rural Economy in Oxford. But with canny foresight he inserted as a first charge on this benefaction a codicil which required the completion of his "Flora of Greece"; and whether from want of interest or lack of opportunity, or perchance a too ardent love of that lotus-land of learning, it was not until twenty-six years later that his successor finished the "Flora," and the benefaction became available for the Professorship of Agriculture. For about half a century the Chair of Agriculture remained as a sort of adjunct to the Chair of Botany. In 1882 the Universities Commission separated the two chairs, and made the Chair of Agriculture a terminable appointment to be held for a period of three years with the possibility of renewal for a second period. Dr. Gilbert (late Sir Henry), the eminent agriculturist, held it for two periods, and was succeeded by Mr. Warrington, a member of the Scientific Staff of the Rothamsted Experiment Station. The duties of the post at that time were not onerous. They consisted in the delivery of twelve lectures during the year, for which the professorial salary was £100. A good deal of the professor's time was spent, not in the compilation of a brilliant address, but in going out into the highways and hedges in order to compel students to come into the lecture hall to listen for one hour twelve times in the year to a discourse on crops, live stock, and manures. Such was the languid interest taken in scientific agriculture by the scholars and general public of that period. Nevertheless, about 1890 something began to trouble the waters of this stagnant pool of rural apathy. It was the great agitation which arose for technical education. As a result, and with the promise of substantial money grants, the leading universities of England, Scotland, and Ireland established Departments of Agriculture. Alone, in her pride and prejudice, Oxford stood apart from this great national movement.

At that moment a man came forward, the Rev. H. J. Bidder, M.A., who stimulated his college—St. John's—to offer to the university the sum of £600 as a supplement to the Sibthorpian Endowment, provided the university would remodel the agricultural branch of the university on modern lines. The university authorities accepted the gift, and Professor Somerville was placed in charge. At that time Oxford had the monopoly of training officers in forestry for the Indian Civil Service. During the past seven years the College of St. John's has spent £9000 in erecting classrooms and laboratories, and last year Mr. Walter Morrison gave the university £10,000 towards the enlargement of the Department of Rural Economy, while the new Development Commission has recently donated the sum of £3000 towards the still further extension of the buildings.

Let us now look at the yearly amount spent upon the promotion of agricultural science by the University of Oxford—

| | | | |
|---|---|---|---|
| £600 | per annum | from | St. John's College; |
| 120 | ,, | ,, | the original Sibthorpian Endowment Fund; |
| 1000 | ,, | ,, | the Board of Agriculture; |
| 200 | ,, | ,, | students' fees; |
| | | | Total, £1920. |

The Agricultural Department of the University of Oxford has been selected by the Development Commission as the Single Research

Station in Great Britain for the study of the Economics of Agriculture. This new branch will embrace the results and statistics of different sorts of farming, large and small holdings, high and low wages. It will cost £900 per annum, of which £600 is being found by the Development Commission, and £300 by the university. Mr. C. S. Orwin has been appointed Director of Research in Agricultural Economics. A special grant of £200 has been given by the Development Commission for research in the physical and chemical properties of the soil relative to the practice of agriculture in Oxford and the surrounding district.

There is no experimental farm in connection with the Department of Agriculture at the University of Oxford. In support of the contention that agricultural science can be taught in a satisfactory manner at Oxford without an experiment station it is affirmed that the business of farming can only be properly learned on an ordinary farm; that the large properties in the near neighbourhood of the universities, which are occasionally visited by the students under the guidance of the Professor of Agriculture, afford ample opportunity for the study of practical farming; and, finally, that a college farm is not a commercial undertaking.

To any one familiar with the Land-Grant Colleges and State Universities of America, agriculture at Oxford presents an amazing contrast. To witness the most renowned University of the Empire, with an aggregate annual income of over half a million pounds sterling, spending grudgingly a miserable £1920 on the study of that great industry, which means so much to her in peace or war, is a lamentable and humiliating spectacle. And to suppose that the student of agriculture can be properly taught without the practical lessons of an up-to-date experiment farm is to imagine that the student of medicine can become a competent physician without the aid of the clinical training of a modern hospital. And few will be found to maintain that a research institution—such as an experiment station or a medical laboratory—should be run as a commercial concern. Moreover, it is said that the courses in rural economy at Oxford have been specially designed to afford a smattering of farming for the sons of the wealthy landlords of England. But has Oxford no duty to perform to the eager-hearted lads of the smallholder, as well as to those virile workers who are engaged in the agricultural development of the distant lands of her world-wide Empire. Agriculture at Oxford is indeed a pleasant pastime, but it is not a serious study.

True, to the dry farmer from the arid plains of South Africa, the green lawns of St. John's College are a dream of bewitching beauty. But a few grass plots in the sterile sand of a mean back yard is not the place to teach practical farming or to inspire the city youth with a love for the open country. And we hope the day is not far distant when the authorities of Oxford will frankly acknowledge that the plough and the harrow are worthy of a place in their calendar as conspicuous as the polished essay or the prize poem of the solitary pedant nourished in the conceit of a narrow cloister.

**Manuring for Mutton.**

Professor Somerville, of Oxford, has been a voluminous writer, and has published one hundred and twenty papers on matters connected with rural economy. His most important work, covering a period of

fifteen years, has been the improvement of pasture lands as tested by the increased production of mutton. As this is a subject which assuredly must be of some interest to South African farmers we shall now give a summary of Dr. Somerville's researches. He has had the inestimable advantage of being able to experiment on a large scale on his own estate in Sussex, which he quaintly terms "Poverty Bottom," and which might well be described in Arthur Young's picturesque words when speaking of his own farm: "I know not what epithet to give this soil. Sterility falls short of the idea—a hungry, vitriolic gravel. I occupied for nine years the jaws of a wolf." Judged by the area occupied by the various crops grown in Great Britain, grass is much the most important. There are approximately twenty-eight million acres of pasture land of one kind or another. Much of this grazing ground is capable of easy and profitable improvement. In the north of England there are wide stretches of poor, high-lying, cold pastures that have gone out of cultivation during the past fifty years. Twenty years ago Dr. Somerville submitted the following suggestions to the Newcastle Farmers' Club: "What we want most of all in this country are agricultural experiments conducted on the following lines: Given a certain area of grass-land of inferior feeding properties, and as equal as possible throughout, let it be divided into two-acre plots, and let duplicate plots be dressed with various kinds of manures, alone and in combination. Then accurately weigh a number of sheep and place four or five on each plot, and at the end of the summer let the various lots of sheep be weighed, so that we may ascertain how they have thriven. Let the same experiment be repeated each year on the same land, either with or without the application of additional quantities of manure, and at the end of ten years, if not sooner, information of a definite and most valuable description will be forthcoming." Since then Dr. Somerville has conclusively shown that by the application of certain manures land of low value can be so enriched as to carry double, treble, and even quadruple its normal head of live stock with much profit to the individual grazier and much advantage to the country at large. The first experiments were conducted at Cockle Park, in Northumberland, where a field of thirty-four acres was selected. It was divided into ten plots of a little over three acres each. Each plot was manured and stocked with three sheep. At the end of the season the different lots of sheep were submitted to the expert judgment of experienced butchers and salesmen. At the commencement of the experiment the grazing value of the plots varied from 2s. 6d. to 5s. per acre. Five years later the treated plots were valued at 20s. per acre. It was interesting to note the gradual improvement of the grasses and the simultaneous disappearance of the poor herbage. For the first nine years each sheep was weighed every month; for the last five years each sheep was weighed three times in the season. This meant 6000 separate weighings. Before weighing, each sheep was fasted for twelve hours. An ordinary Salter's balance was used, by which one hundred sheep can be weighed in two hours. The experiments were duplicated at Sevington in Hampshire, at Cransby in Northamptonshire, and at seven different experiment stations in Scotland.

**Effect of Basic Slag.**

The effect of 10 cwt. (1120 lb.) per acre of basic slag applied in a single dressing was remarkable. Let us study this table.

Place of experiment: Cockle Park.

Number of years since the slag was applied = 9.
Live weight increase per acre over untreated plot: 719 lb.

| | | | |
|---|---|---|---|
| Value of live weight increase at 3d. per lb. ... ... ... | £8 | 19 | 9 |
| Net gain per acre from use of slag ... ... ... ... ... | 7 | 14 | 9 |
| Net gain per acre per annum ... ... ... ... ... ... ... | 0 | 17 | 2 |

Professor Somerville maintains that the persistency in the action of basic slag and of phosphatic manures generally, when applied to pasture, is doubtless in large measure due to the accumulations of nitrogen stored up in the land as a result of the stimulus imparted to the leguminous plants. Moreover, when the whole period of nine years is considered the evidence is conclusively in favour of a heavy dose of basic slag at one dressing rather than the same amount of slag applied twice separated by a three-year interval. There need be no fear that stock will in any way suffer from grazing newly slagged land. The small amount of slag that animals may consume is more likely to do them good than harm. Such, at least, is the experience of the best farmers on the Continent of Europe. The use of any nitrogenous manure along with phosphate on grass land is condemned, since the phosphate stimulates clover, while the grass is stimulated by the nitrogen, which in turn smothers the clover. These two manures are, therefore, antagonistic. Summing up, these experiments have demonstrated that basic slag when applied as a single dressing at the rate of half a ton per acre has generally proved a most effective agent in improving the feeding value of pasture, and its effects are not nearly exhausted at the end of nine years. Further, it has proved much more profitable to apply a heavy dose of basic slag as a single dressing than to divide it into two equal portions and apply these at an interval of three years.

**The Rothamsted Experiment Station.**

The most famous experiment station in the world is that from which emanated the illuminating researches of Gilbert & Lawes and which bears the name of Rothamsted. To a member of the Union Department of Agriculture, which is spending annually approximately three-quarters of a million sterling on the promotion of agriculture, it was a matter of constant surprise to discover how much has been done in England with paltry sums of money. Moreover, it is plain that a lavish expenditure of money will prove of little avail unless it is supported by ability, energy, and enthusiasm. The reputation of Rothamsted has been built up, not by magnificent endowments, but by the personality of its staff, both past and present. Mr. R. D. Hall, F.R.S., who is the foremost British agriculturist, was the Director of the Rothamsted Experiment Station until a short time ago, when he resigned to become one of the Development Commissioners of Great Britain. Many of our journal readers will recall the fact that Mr. Hall visited South Africa a few years back along with the British Association, and he is keenly interested in our agricultural progress. He has been succeeded by Dr. E. J. Russell, a young scientist, who has already won European renown. It may also be of interest to state that Mr. F. B. Smith formed one of a small committee of three who

selected Dr. Russell for his first important post in the Wye Agricultural College when he was still a comparatively unknown and obscure man. Then he knew no farming, but showed promise of becoming a brilliant investigator, and the committee wisely decided that he could acquire the art of agriculture, while he taught the science of the soil. Let us now look at the money which is annually allocated to the Rothamsted Experiment Station:—

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|---|---|---|---|
| General Investment Fund (Sir John Lawes' legacy), interest at 2½ per cent. ... ... ... ... ... ... ... ... ... | £2632 | 19 | 9 |
| Goldsmiths Company Endowment (£100,000) ... ... ... | 324 | 5 | 2 |
| Government Grant (Development Commission) ... ... ... | 2500 | 0 | 0 |
| Subscriptions ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... | 410 | 0 | 0 |
| Total ... ... ... ... ... ... ... ... ... ... | £5867 | 4 | 11 |

Of this amount the sum of £3700 is expended on the salaries of the Laboratory staff, and the balance goes to the cost of experimental plots, apparatus, travelling, and printing reports. Dr. Russell was good enough to outline for us the main lines of work at Rothamsted. There are three, and they deal chiefly with soil studies and plant nutrition. An important subject of research is the production of plant food, and that means the production of nitrates. This work has been chosen because in Great Britain the nitrogen supply in the soil is usually the limiting factor in crop production. This involves three lines of research: (1) The chemical processes whereby the nitrates are produced; (2) the living agents whereby these changes are produced; (3) the chemical losses going on during the process. The first problem is not of practical interest to the agriculturist, but is essential for the proper understanding of the expert adviser. The second line of research was at first taken up tentatively and thought to be of little or no value, but it has proved of great importance. Exhaustive experiments have shown, not only that the average soil is full of living organisms but that the farmer can largely control these germs, destroy the bad, and leave the good to work freely in his fields. Moreover, the researches of Russell and his collaborator, Hutchinson, have revealed an important law, namely, that the more useful organisms are most resistant to adverse circumstances and the less useful are less resistant to the same conditions. Suppose the soil is heated to a temperature not too high (50° to 100° C.—or 122° to 212° F.) or treated with some mild poison such as Toluol, quicklime, or carbolic acid in a small quantity, or exposed to a long drought, then it will be found that some of the soil organisms have been destroyed, and those which still survive are more useful and valuable than those which have been killed. The Rothamsted experiments have proved conclusively that drought has a beneficial effect upon the soil germs. Furthermore, the year 1911 was a season with a good deal of consecutive sunshine, and it was shown that sunshine had the same beneficial effect upon the land as artificial heating. This is a most interesting and important discovery, and we hope it will be thoroughly tested in South Africa on the dry-land stations of the department. It has long been our opinion that the constant cultivation of our dry soils which are bathed and aerated by continuous sunshine will be found to increase both the numbers and the activities of the nitrifying soil bacteria. And now as to the practical results of these researches. They

have been successfully applied, on a large scale, in commercial glass-house culture. The experimenters at Rothamsted demonstrated the fundamental principles of soil flora, but their methods of treatment were both costly and cumbersome and fitted more for an earthern pot than for the open field. At this juncture they called to their aid some market-gardeners living in the Lea Valley, some ten miles to the north-east of London. This is a famous centre for market-gardening, glass-houses, and intensive culture. These men took up the matter heartily and speedily introduced several practical improvements in the rapid and deep sterilization of soils. They reduced the cost from 5s. to 1s. 2d. per ton of treated earth. But not content with this, so enthusiastic did they become that they donated the sum of £1250 out of their own pockets to start in their midst a small sub-station, under the Rothamsted control, where these soil germ problems could be worked out. This is a delightful instance of a practical lead being given by the experiment station and followed by self-help. These market-gardeners have found that the sterilization of their ground improves their crops by destroying injurious bacteria and other deleterious organisms.

Let us now briefly discuss the third line of investigation, viz., the chemical losses. These losses are partly nitrates and partly gaseous nitrogen. The former directly concerns the farmer. He has to buy his artificial manures, and he wants to retain in the soil as large a percentage as possible. The Rothamsted drain gauges show that during the dead season (late autumn and winter) there is a loss of as much as 50 lb. of nitrogen per acre, and about 3 cwt. of nitrate of soda of a value of 36s. (12s. per cwt.); or as much nitrogen as is present in a full crop of wheat on an average acre, i.e. 4 quarters or 32 bushels (4 quarters × 8 bushels). Two problems actually arise: (*a*) When these chemical losses occur, and (*b*) how these losses are affected by different methods of cultivation. It has been demonstrated that these losses can be greatly reduced by planting late crop, such as mustard, vetches, or any catch crop; and experiments have now been devised to fit in with the everyday economy of the farm.

Lastly, we come to the losses sustained by the waste of gaseous nitrogen. This problem is still obscure, but experiments have proved that these losses are at a maximum in the vicinity of decomposed organic matter, such as manure heaps, as well as upon plots which have been liberally treated with farmyard manure, well ploughed, and well cultivated. The policy of Rothamsted is to issue short, summarized reports. People have no time nowadays to wade through interminable reports. All they want is a summary of results and conclusions. The full details should be published somewhere else in a magazine devoted to that purpose. Any paper compiled by a member of the technical staff is sent to some scientific society which deals with this matter. The Rothamsted view is that any publication which is good enough for a scientific society is good enough for the farmer and vice versa. We were gratified to meet two Government agricultural scholars who were completing their studies at Rothamsted, Mr. R. J. Smit, of Pretoria, and Mr. Sonnenveldt, of Johannesburg. The Director informed us that both students were making marked progress and were a credit to the country of their origin.

# The Preparation of Caustic Soda and Sulphur Dip.

By A. D. Shilston, Veterinary Research Division, Maritzburg.

During the course of a series of experiments which were carried out to ascertain whether the caustic soda and sulphur dip exerted any injurious effect on the health of sheep, attempts were made to reproduce the worst possible conditions under which sheep might be dipped in this fluid and various departures from the correct method of preparation were adopted; at the same time the composition of the resulting mixtures was tested.

It was then found that under certain conditions a dipping fluid was produced which, though apparently not particularly harmful to the sheep itself, was likely to have a damaging effect on the wool of sheep immersed in it, besides being less reliable as a curative agent in the treatment of sheep scab.

The importance of this observation lies, however, in the fact that the circumstances under which these variations in composition were found to take place were such as might easily occur on the farm unless special care were taken to ensure the directions being exactly followed. From the reports of sheep inspectors and farmers it is evident that frequently the necessary care is not exercised, and there is little doubt that this fact accounts very largely for the disfavour with which the caustic soda and sulphur dip is viewed in certain quarters.

It is well known that solutions of caustic soda have a solvent action on wool, and the presence of this agent, in an uncombined form in the dip, is the cause of the injury to the wool fibre.

But the compounds formed by the union of caustic soda with sulphur, that is, polysulphides and hyposulphite of soda, have no dissolving effect on wool. The statement made in a recent letter from Bradford that during the process of scouring "caustic soda is set free" from the above compounds and "acts powerfully on the wool," is quite incorrect.

Very soon after dipping the sulphur compounds in the fleece undergo oxidation, and sulphites and sulphates of soda are formed, together with free sulphur, but it is impossible for caustic soda to be set free from any of these substances by the process of scouring.

Experiment has shown that caustic soda and sulphur combine with each other in the proportion of, aproximpately, 25 of the former to 38 of the latter.

In the formula recommended for preparing 100 gallons of this dip, 5 lb. of caustic soda should therefore unite with 7⅝ lb. of sulphur, thus leaving 12⅜ lb. of sulphur undissolved. When the directions given for mixing the sulphur paste and adding the caustic soda are correctly followed combination takes place in practically the above proportions, as is seen in Table 1, page 748, and very little free caustic soda remains in solution.

But in order that the above chemical action may take place a certain temperature is necessary.

As is readily appreciated when mixing the dip, a considerable amount of heat is generated by the chemical action set up, but unless this is sufficient to raise the whole mixture to practically boiling point, the combination will not be complete and a certain amount of caustic soda will remain in solution, uncombined with sulphur. It is for this reason that the directions state that *boiling* water must be used in preparing the sulphur paste, and not more than is required to form a thick cream. When too much water is added the reaction is slower and the necessary heat is not given off for complete combination; should the temperature of the water in this case be considerably below boiling point, very little action may take place at all, and the resulting liquor will then be strongly alkaline and highly injurious to the wool. Not only is such fluid dangerous to use, but it is also ineffective as a curative agent in the treatment of scab.

Another undesirable occurrence has also been noted as the result of carelessness in mixing this dip, namely, the formation of hard masses in the undissolved sulphur. As has already been remarked, just over three-fifths of the sulphur is unacted upon, but when the dip is correctly prepared this remains in its original condition in suspension in the liquid; in this form it will become deposited as a fine powder in the sheep's fleece and act beneficially as a deterrent against fresh infection.

The fusion of the sulphur into lumps is due to the excessive heat produced by too rapid addition of the caustic soda to the hot sulphur paste. It can be avoided by adding the former slowly or by pouring in a little more water when the reaction is very energetic and keeping the whole well stirred

Apart from the disadvantage mentioned by reason of the masses of sulphur sinking to the bottom of the tank instead of remaining as fine particles in suspension, there is little real harm likely to result from this occurrence, as it has been found that the composition of the fluid itself varies but slightly from that correctly mixed.

The difficulty of regulating the reaction between the caustic soda and the sulphur so as to avoid the disadvantages resulting both from their too rapid combination on the one hand and incomplete union on the other, led to the carrying out of tests to ascertain whether a more uniform result could not be obtained by boiling the ingredients instead of relying on the activity of the chemical reaction for the production of the necessary heat.

The details of these experiments will now be given.

In the dip, the caustic soda is entirely dissolved, no matter to what extent chemical combination between it and the sulphur has taken place, but sulphur is quite insoluble in water, so that only that part which actually combines with the caustic soda goes into solution. If, therefore, the amount of sulphur remaining undissolved is ascertained, the loss in weight represents the quantity that has become dissolved and shows the extent to which combination with the caustic soda has taken place.

The degree of completeness of the reaction can also be determined by taking the specific gravity of the fluid, as this is directly proportionate to the quantity of sulphur dissolved. Provided care is exercised to ensure a constant temperature of the liquid when making the test, the taking of the specific gravity supplies a simple means of ascertaining the strength of the dipping fluid, and this method is equally applicable to the lime and sulphur dip.

In practice an instrument known as an hydrometer is employed, and is sufficiently accurate for most purposes. The figures recorded in the present observations were, however, obtained with the extremely delicate Westphal balance.

The alkalinity of the fluid also indicates the extent to which the caustic soda has failed to combine with sulphur.

For obvious reasons a full hundred gallons of the dipping fluid was not mixed in making each of the following observations, but as the correct proportions of caustic soda, sulphur, and water were exactly maintained, the results are strictly applicable, and for greater clearness the weight of undissolved sulphur is stated, both as a percentage of the total originally taken and as its equivalent in pounds per 100 gallons of dip.

The following table shows the weights and percentage of sulphur dissolved and undissolved, also the specific gravity of the fluids, in the case of dips correctly and incorrectly mixed:—

TABLE I.

| | Sulphur undissolved, per 100 gallons of Dip. | Sulphur dissolved per 100 gallons of Dip. | Specific Gravity of Fluid. | Alkalinity of Fluid. |
|---|---|---|---|---|
| 1. Caustic soda and sulphur mixed according to directions and allowed to stand 40 minutes | 12·5 lb. (62·5 %) | 7·5 lb. (37·5 %) | 1007·5 | Very little free caustic alkali. |
| 2. Caustic soda added quickly to sulphur paste, so that the sulphur "caked" into hard masses; left 40 minutes | 12·68 lb. (63·4 %) | 7·32 lb. (36·6 %) | 1007·0 | Practically the same as No 1. |
| 3. Sulphur mixed with excess of cold water and caustic soda added; very little reaction; left 40 minutes | 19·64 lb. (98·2 %) | 0·36 lb. (1·8 %) | 1004·8 | Strongly alkaline. |

It will be noticed that when the dip is mixed so that a too energetic reaction takes place causing the sulphur to form into lumps (No. 2), the weight of sulphur dissolved and the specific gravity is only slightly less than when proper care is exercised (No. 1), but the value of the undissolved sulphur is greatly lessened by reason of its condition.

In No. 3 only a very small part of the sulphur is dissolved, and the specific gravity is therefore practically that of a solution of caustic soda of 5 lb. to 100 gallons of water; the liquid was only a pale straw colour and strongly caustic.

This must be regarded as an extreme instance of incorrect mixing, but there is reason to believe that in certain cases almost equally defective dip has been prepared and employed for dipping sheep, naturally with bad results.

Table II shows the results obtained after mixing a dip correctly, but instead of allowing it to stand for forty minutes it was boiled for half an hour; the effect of boiling dips No. 2 and No. 3 of Table I for half an hour is also shown.

TABLE II.

| | Sulphur undissolved, per 100 gallons of Dip. | Sulphur dissolved per 100 gallons of Dip. | Specific Gravity of Fluid. | Alkalinity of Fluid. |
|---|---|---|---|---|
| 4. Dip correctly mixed but boiled for 30 minutes | 12·5 lb. (62·5%) | 7·5 lb. (37·5%) | 1007·5 | Very little free alkali. |
| 5. Dip No. 2, Table I, boiled for 30 minutes | 12·74 lb. (63·7%) | 7·26 lb. (39·3%) | 1006·6 | Very little free alkali. |
| 6. Dip No. 3, Table I, boiled for 30 minutes | 12·8 lb. (64%) | 7·2 lb. (36 %) | 1006·8 | Very little free alkali. |

Comparison of No. 4 with No. 1 (Table I) shows that the composition of these two dipping fluids is identical. The excess of undissolved sulphur and free caustic soda in No. 3 dip (Table I) has entirely disappeared, and a fluid remains of practically the same composition as that correctly prepared. In the case of No. 2 dip, half an hour's boiling resulted in a slight increase of undissolved sulphur and consequent reduction in the specific gravity.

The effect of prolonged boiling of the fluid was also ascertained.

One litre of dipping fluid (No. 1) correctly mixed, was boiled for one hour, when it was seen that a small amount of sulphur had become precipitated from the liquid; on weighing, this was found to represent .7 per cent. of the original quantity of sulphur employed (20 lb. to 100 gallons) or .14 lb. per 100 gallons.

The effect of an hour's boiling is therefore very slight, and as no free caustic soda is liberated by the precipitation of the sulphur from the solution, no injurious result can follow even prolonged boiling, except weakening of the strength of the liquid.

As the time occupied in the preparation of a dip is a matter of considerable importance, another mixture was made and boiled only ten minutes. This was found to give just as good results as when boiled half an hour, the figures obtained being practically the same as for dips Nos. 1 and 4.

## CONCLUSIONS.

1. With proper care in mixing, the chemical reaction between sulphur and caustic soda is practically complete, so that little or no free caustic soda remains in the liquid.

2. Non-observance of the directions may, however, lead to the production of a fluid containing considerable amounts of free caustic soda and little dissolved sulphur.

3. Boiling the correctly mixed fluid causes after a short time the precipitation of sulphur, but unless continued for an hour or more this is not sufficient to seriously weaken the fluid, and in any case free caustic soda is not liberated by the process.

4. Boiling the ingredients for ten minutes is sufficient to complete the chemical reaction, even when the mixing has been improperly carried out, and is the surest means of producing a fluid of uniform composition.

When the mixture is going to be boiled, it is not necessary to employ boiling water for mixing the sulphur paste, and more water may be added than when the mixture is not boiled.

# South Africa as a Sheep Country.

By Charles Mallinson, Senior Sheep and Wool Expert (Northern Division).

This article has been written to meet the needs of farmers and intending settlers in the Union, with a view to furnishing some information regarding sheep farming in South Africa. The writer has been in this country for nearly four years, during which time his official duties have called him to visit a very large number of breeders of sheep in all parts of the Union. Four years is perhaps too short a time to justify any one in making definite statements regarding South African conditions, which are varied in the extreme, but still a general review can be given.

South Africa has no clearly defined areas within which it is profitable to farm with sheep and outside of which they will not pay. In almost every district of the Union there are farms well adapted for sheep farming, and adjoining these will be found areas of ground totally unsuitable for such a purpose. There are still large tracts of country where sheep breeding on modern lines has not yet been tried, but, speaking generally, South Africa is well adapted for sheep breeding, and, in parts, merino sheep do exceedingly well. There are, however, so many factors to be considered and dealt with (i.e. soil and climatic conditions, water supply, availability of markets, transport difficulties, etc.) that it is well to depend upon personal inspection of farms rather than to accept the reports of others regarding the fitness of farms for breeding stock. When setting out to acquire a farm it is well to seek the guidance of some experienced sheepman who is competent to advise and who is acquainted with the local conditions.

Strange as it may seem, some of the best sheep country in the Union is to be found in those districts where the flocks are as yet but few. Lichtenburg and Wolmaransstad, and, indeed, practically the whole of the western portions of the Transvaal and Orange Free State Provinces, are admirably suited to sheep, and so, too, is Bechuanaland. Large flocks are already established in the eastern and midland portions of the Cape Province, in the Orange Free State, and in the high veld portion of the Transvaal. There is some very good sheep country in Natal and in the north-western Provinces of the Cape of Good Hope, which latter, unfortunately, are stocked with Africander and bastard sheep instead of merino sheep.

Chief amongst the difficulties in the way of sheep farming in South Africa are lack of proper water supply and shade trees for shelter. The first difficulty will in time be overcome, for the Government is making strenuous efforts in dam construction and boring efforts; the remedy for the second difficulty lies in the farmers' own hands, for there are but few spots where trees—of one sort or another—will not thrive, given ordinary care. Sir Rider Haggard, who recently visited Australia, is reported to have said: "People all over the world will go on cutting trees down, with the result that so much rain is lost. I do not say that forests affect the rainfall." It should be remembered, however, that where there are no trees the ground becomes hard and the rain flows away to the sea without doing any good to the land. Plant a tree then wherever space is available.

Scab has been the greatest curse of South Africa, for many of the farmers are ignorant of the nature of the disease and doubt the efficacy of dipping.

It is very pleasing to note that a better spirit in regard to dipping is beginning to prevail, and it is hoped that before long scab will become a thing of the past. Even where there is no scab, sheep should be dipped at least once a year, for such dipping is good for the health of the animal, and, properly carried out, is good for the wool.

One of the principal reasons for the continuance of scab is that the farmers on the high veld trek with their stock for the winter months to the low veld (where it is warmer and where, during the summer months, the only residents are natives, each keeping a few poor stock which are generally infected with scab). The low veld is thus a hotbed of infection, and when the good sheep come down for the winter they contract the disease, either from contact with the native flocks or at the camping and watering places along the roads. These facts are beginning to be recognized by the more progressive farmers, who are providing winter crops so that their flocks need not trek. The wealthier men who have money to fence off their farms into paddocks experience but little difficulty with scab when once they are convinced of the folly of exposing valuable animals to the fatigue of an arduous trek and the almost certain risk of infection, but the farmer with a small flock has not yet found his remedy, though the Government advances funds for the fencing of farms at a low rate of interest and easy terms of repayment.

Farmers should camp off their farms and make provision for water in every camp, so that sheep can go and drink whenever they are so inclined and not be driven; plenty of good clean water is half the food. If farmers would do this half the evils they have at present to contend against in the way of diseases would disappear. It does not matter how clever or scientific a man is in his methods, unless he fences off his farm into camps according to its size and provides water in every paddock, he cannot farm successfully with woolled sheep. He may do so after a fashion, but it is not the way to make money at it. Some farmers only water their sheep at the homestead, driving the sheep there to drink—and then only about twice a week. Such a course is absolutely wrong. It is not for the farmer to say when his sheep ought to drink; water should be provided out on the run so that the sheep need not be driven and can get a drink whenever they want. If sheep are watered at the homestead when the owner thinks fit, they drink more than they should, and, instead of it doing them good, it does harm, and the farmer wonders what is the matter. Such methods constitute bad farming—bad management. Apart from the danger of the sheep drinking too much, the trek to and from the homestead pulls down their condition and fills the wool with dust—both serious evils.

The following information regarding the possibilities of the Union for sheep farming has been collected by the Division of Sheep, and is now published for the guidance of sheep farmers:—

## PROVINCE OF THE CAPE OF GOOD HOPE.

On the whole, this Province has an excellent future so far as sheep and wool are concerned. The north-western districts are somewhat

backward, but their difficulties are chiefly due to droughts and lack of transport facilities. Boring for water will remedy the first, and it is hoped that before long the Government will see its way to construct railways to overcome the second.

In Aberdeen, Graaff-Reinet, Murraysburg, Willowmore, and Steytlerville, where ground can be had at prices ranging from 12s. 6d. in the flats to 60s. in the mountains, the climate is favourable to sheep, though rather warm in parts. In the flats one sheep can be kept to two morgen, whilst in the mountains one morgen is sufficient for a sheep. Labour is scarce and jackals are somewhat of a pest. Jackal-proof fencing is a necessity if sheep are to run night and day as they should.

In Albany, Cathcart, Stutterheim, Kingwilliamstown, and Queenstown, land realizes an average price of £5 per morgen. A cold, severe winter is experienced. Three sheep can be kept to one morgen, and the future prospects are excellent. Labour is plentiful, but of an inferior character.

In Burghersdorp, Steynsburg, Maraisburg, and Tarka, farms fetch from £2 to £4 per morgen and carry from one to one and a quarter sheep per morgen. The climate is mild. Labour is scarce.

In Bedford, Somerset East, Pearston, Uitenhage, and Port Elizabeth, one sheep requires one and a half morgen, and the price is from £3 to £4. 10s. per morgen. The climate varies, being very dry in parts. Labour is moderately scarce.

In Philipstown, Britstown, Colesberg, and Cradock, land fetches from about £2 to £4 per morgen, about two morgen being required for one sheep. The climate is fair with occasional droughts. Labour is scarce.

In Uniondale, Humansdorp, and Mossel Bay, land fetches from £3 to £4 per morgen, and a morgen will carry one to one and a half sheep. In Prince Albert, land is 7s. 6d. per morgen, and it takes four morgen to support one sheep. The Karroo portions suffer from periodical droughts. The climate is generally favourable, but the Karroo portions are very dry. Labour is very scarce.

In Aliwal North, Barkly East, Herschel, and Wodehouse, land realizes from £4 to £6 per morgen, and one morgen is sufficient for about two and a half sheep. The climate is favourable, and labour is fairly plentiful.

In Beaufort West, Carnarvon, and Fraserburg, land fetches from 10s. to £2 per morgen, and it takes three morgen to keep one sheep. The climate is very dry and labour is scarce.

In Ceres, Calvinia, and Sutherland, land realizes from 5s. to £2. 10s. per morgen, and it takes about four morgen for each sheep. The climate is mild to hot in summer and cold in winter. The labour supply ranges from moderate to scarce.

In Van Rhynsdorp, land fetches from 7s. 6d. to 15s. per morgen, and one sheep goes to four morgen. Labour is scarce.

In Herbert, Hay, Barkly West, Griqualand West, and Hopetown, sheep farms vary from 15s. to £1. 10s. per morgen, two morgen being required for one sheep. Dry, hot summer, and cold winter. The labour supply is moderate.

In Prieska and Kenhardt, the price of sheep farms averages from 10s. per morgen; carrying capacity is one sheep to two or two and a half morgen. The climate is warm and dry, and many of the farms

are badly infected with insect pests. Labour is scarce and the outlook at present is not too good.

In European areas in the Transkeian territories, land fetches an average of £3 per morgen, two sheep going to one morgen. The winter is very cold. Labour is scarce.

In native areas in the Transkeian territories, sheep land fetches an average of £5 per morgen, one morgen being sufficient for three sheep. The climate is favourable, but droughty at times. Labour is scarce.

In East Griqualand, sheep farms realize from £2 to £3 per morgen, one morgen being sufficient for three sheep. Cold winter. Labour supply moderate, but irregular.

### PROVINCE OF THE ORANGE FREE STATE.

In the eastern portion of this Province, sheep farms fetch from £4 to £6 per morgen, one morgen being sufficient for two to three sheep. There is a good rainfall, though it is somewhat irregular. Labour is scarce.

In the central districts of the Free State, ground realizes from £3 to £5 per morgen, two morgen being required for one sheep. The climate is favourable to sheep breeding. Labour is both scarce and bad.

In the western portion of this Province, land fetches from £1 to £2 per morgen, one morgen being sufficient for one sheep. The climate is very favourable and the labour supply is moderate.

### TRANSVAAL PROVINCE.

In the eastern Transvaal, sheep land fetches £5 per morgen. Sheep cannot be kept on the high veld during the winter months without additional feed, but where this can be provided, one morgen is sufficient for two to three sheep. The climate is healthy; dry and cold in the winter. Labour is scarce.

In the central portion of the Transvaal, land realizes £3. 10s. per morgen, and sheep cannot be kept in the winter without additional feed. The climate is fair and labour is scarce. In the Waterberg and Zoutpansberg Districts, blue-tongue is bad and many farms are infested with ticks.

In the western Transvaal, sheep land varies from 35s. to 60s. per morgen, one morgen being sufficient for two sheep. The climate is dry and fair and very favourable for the breeding of merino sheep. There is a sufficient supply of labour.

### PROVINCE OF NATAL.

In Natal, good sheep land ranges from 25s. to £6 per morgen, according to quality. Speaking generally, one morgen is sufficient for two sheep. The climate is subtropical, and, on the whole, favourable for sheep farming. There are occasional hailstorms and excessive rains, and duststorms are frequent in parts. In the uplands sheep require additional feed in the winter. Blue-tongue is bad at times.

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The above information cannot be guaranteed to be absolutely correct, but, generally speaking, it represents the conditions obtaining in the different parts of the Union, and should serve as some guide to those desirous of taking up sheep farming.

The amount of capital required to farm successfully with sheep is dependent upon several things: the district selected; the class of stock to be kept; and the ability of the farmer. It can, however, safely be stated that a farmer who knows his business, with a moderate capital, will, in a suitable locality, obtain a good return for his money. Good breeding ewes of fair quality can be obtained at from £2 to £3 each. Good flock rams realize from £5 to £25, whilst stud rams of high quality can be purchased from £40 upwards. If there is need for economy in the purchase of foundation stock, it is urged that it should be that true economy which is shown by the limited size of the flock rather than by a larger flock of low-priced animals.

# Milk Records and their Advantages.

By J. B. FISHER, N.D.D., Lecturer and Instructor in Dairying.

FOR some years past most countries in which dairying has been carried on to any great extent have been making great efforts to improve the milking qualities—both quantity and quality—of their cattle. Many experiments indicate that if a cow is suitably fed and kept in fair condition, then any improvement in the ration does not permanently improve the quality. In other words, you cannot increase the fat percentage in milk by feeding, although you can increase—to a certain extent—the quantity. It has been found that the only method of raising the quality of milk, and the most advantageous way of increasing the quantity, is by the systematic use of milk records. A milk record is understood as a record kept of the quantity and quality of milk given by each animal in the herd during each lactation period. If the subject is carefully studied, no doubt will remain as to its importance, and when the value of these records becomes fully recognized, every dairy farmer will see that they are kept as a part of the general routine in the management of his herd. It is difficult to ascertain just when the use of milk records was discovered, but within recent years great strides have been made in Denmark, Canada, America, Australia, and New Zealand. Perhaps the greatest increase in the last ten years has taken place in the south and south-west of Scotland, where the number of cows undergoing the milk record test has risen in the last four years from 8132 in 193 herds to 18,000 made up of 435 herds. This in itself proves that farmers realize their importance and value.

With properly kept milk records to refer to, the farmer will be able to tell exactly what each cow is capable of producing in milk and butter in the year, and can weed out the unprofitable milkers, or "boarders" as they are termed, as opportunity occurs.

It is a common belief among farmers that the man who does the milking knows the best cows in the herd as well as the poorest; but numerous experiments have demonstrated clearly that this belief is unwarranted. Many factors show that this judgment is wrong. The cow which gives a generous flow of milk during the first few weeks of her period of lactation is usually regarded as the best. She may soon go down in her flow of milk, and perhaps goes dry for four or five months of the year, but this is not observed, and only the memory of the large flow she gave when fresh lingers in the mind of the owner. Another cow may give only a fair flow of milk after she calves, and may not be regarded highly by her owner; but she may continue at the same rate of yield for a long period, and will in the end prove a great deal more valuable than the other cow. No milker can tell, without weighing the milk regularly, whether a cow gives 600 gallons or 800 gallons of milk in a year; still, the difference may prove the difference between profit and loss on that particular cow. When the milk is valued according to its butter-fat content, unsupported estimates of the cow's performance are still more uncertain.

It requires frequent testing to ascertain the average percentage of fat in the milk of a cow's yield; the fat percentage as a rule varies from milking to milking, and from day to day. There may also be a great variation in the richness of the milk yielded by a cow when she is fresh as compared with a time later in the period of lactation. Also different cows consume different amounts of food, and it is impossible for the feeder to estimate accurately the difference in cost of feeding the various cows for a year, unless records of the food are kept systematically. If at any time the dairy herd has to be disposed of, the value of milk records will then become manifest. By being able to produce evidence that the herd has been systematically built up on sound lines, a much higher price can be obtained for their produce; while the bulls bred also command higher prices when evidence is forthcoming as to the milking properties of the dam. Unfortunately cows possessing the best outward appearance and show-yard merit are very often the least profitable.

Some farmers are of opinion that the keeping of milk records is more of a competition between different herds and individual cows, but this is not so. What is wanted is not a record milk yield, but a record of the milk yield, for a succession of years. It is impracticable to keep milk records where calves are allowed to run with their mothers, and as soon as this undesirable practice is done away with in dairy herds the better it will be for the dairy farmer. Only the heifers bred from cows possessing good milk records should ultimately be introduced into the herd. If this be done constantly for a number of years the herd will reach an appreciably higher standard of milk production. Apart from the benefits of breeding from milk-record cows, it is equally important to use a milk-record bull and to know that he is descended from a heavy milking strain.

Too often the big, fat, bony cow is pointed out as being a "grand cow from which to breed a bull." This, in spite of the fact that the

person making the assertion knows that the animal is no milker whatever, but simply because it is a "very big animal," and a bull calf from it would be "just the thing." One should not forget that "like tends to beget like."

Another advantage of the record sheet is that it is a good index of the health of the cows from day to day. By this means cases of illness can be detected in their early stages, and prompt measures taken to deal with them. Further, it acts as a check on irregularity or carelessness in the feeding of cows. As a check on carelessness in milking alone, it is worth more than all the trouble involved.

There are one or two different methods of keeping milk records. In some cases it is the custom to weigh the milk every morning and evening, but in others it is weighed only once a week, once in two weeks, once in three weeks, or monthly, and sometimes, in America, once every six months, and the aggregate in all but the first case is arrived at on the law of averages.

Naturally the daily weighings are the most correct, and as an example of this I give the result of an experiment recently carried out in England to determine the difference between the various ways of taking the records. Twenty-eight cows were tested, and taking the aggregate—by daily weighings—it amounted to 21,339.4 gallons; by weekly, to 21,329.9 gallons; by fortnightly, to 21,143.8 gallons; and by tri-weekly to 20,803 gallons. From this one can see that the test carried out at different periods is not as reliable as when carried out daily.

It is possible for the farmer, by weighing, to ascertain the amount of milk that each cow in the herd produces, and ever since the invention of the Babcock test, or the Gerber test, he has had an easy means of knowing the fat content of the individual cow's milk. Very few farmers, however, take advantage of this opportunity; not because it would not pay them to do so, but largely because the testing and totalling up at the end of the lactation period is tedious work, and requires care and regularity and time to make it accurate. To be successful, a system for obtaining these data must be independent of other work on the farm.

With the daily method of testing, samples of milk will have to be taken at least once a fortnight and tested by either a Babcock or Gerber milk tester, to determine the percentage of fat present in the milk. The fortnightly test is the most frequently carried out, the evening and morning's milk being weighed once a fortnight and a sample taken to determine the fat percentage, and the total calculated from this.

An example of this would be:—

*Number of cow*.............. *Date of calving*...........

| Date. | Milk. Evening. | Milk. Morning. | Per Day. | Days. | Total. | Fat per-centage. | Fat. | Remarks. |
|---|---|---|---|---|---|---|---|---|
| | lb. | lb. | | | lb. | | lb. | |
| 1st Jan. | 10 | 15 | 25 | 14 | 350 | 3·4 | 11·9 | |
| 15th „ | 10 | 12 | 22 | *14 | 308 | 3·0 | 9·2 | |

* 14 is the number of days since the last test was taken.

At the end of the lactation period the yield of milk is totalled up, also the number of pounds of fat, and from the two the average percentage of butter-fat for the year is also calculated.

A vast amount of information is placed before every farmer who keeps a milk record, if he knows how to use it. By persevering with his herd in this way it will gradually attain a higher standard of milk production without any additional expense in labour and food consumption.

It can be seen from the foregoing that a certain amount of labour is entailed in the keeping of milk records by the farmer, and to simplify matters, milk record associations have to a great extent taken the place of the periodical test as carried out by the farmer himself. The chief aim of a milk record association, or cow-testing association, as they are sometimes called, is to obtain records of the yearly production of milk and butter from each individual cow in the herds of the members, and with these data as a basis, by selection of the best producing cows for breeding purposes, to develop a strain of cows which would produce a large quantity of milk rich in butter-fat.

The usual way of organizing an association is first to ascertain the extent of the interest in dairying in a community, and to call a meeting and explain the merits of the milk record association as an institution. If sufficient interest is exhibited to warrant going on with the work, the district is canvassed in search of farmers who wish to become members of the association. When enough have been secured, a second meeting is called, at which the organization is perfected, officers elected, and rules drawn up.

In order to support the milk record association it is necessary to have at least twelve members enrolled. This number would allow for the fourteen-day test being carried out. If the herds are conveniently located, eighteen members could be enrolled, and in this case the twenty-one day test carried out.

The method of operation is as follows:—

The recorder arrives at the farm in the afternoon, weighs and samples the milk at the evening's milking, and the same at the morning's milking. The mixed sample of the two milkings of each cow is then tested for butter-fat, and the result, along with the weights of milk, entered in a book which the recorder carries with him—one copy of which is given to the farmer himself for future reference. When this has been accomplished the recorder packs up his outfit and goes on to the next farm, to be there in time for the evening's milking. The mode of conveyance from one farm to another may be accomplished in either of two ways, arrived at between the members of the association, namely:—

The recorder is provided with a horse and trap, by which he travels between the farms, or each farmer is responsible for his delivery at the next farm after he has completed his testings.

The testing outfit carried by the recorder consists of a twelve-bottle Gerber tester and all necessary appliances, such as glassware, alcohol, acid, etc., along with a special spring balance and bucket for weighing the milk.

The milking at all the farms should be done at the usual time, in order that the average yield may be obtained as accurately as possible. The recorder has much to do with the successful working of an association. He should have had a special training for the work. Punctuality,

regularity, and accuracy are necessary and of great importance, for unless he has these qualities the records may not be a true indication of the value of the respective cows. The recorder should also have the ability to advise farmers as regards the feeding of the cows, calves, etc. A milk record association depends largely for its success upon the reliability of the recorder, and also to a great extent on the members themselves. They should be willing to benefit by the lessons which the milk records teach, put into effect such changes in feed, stabling, etc., as the records show will be profitable.

Dairymen who have no facilities for testing their milk and cream can have the test for butter-fat made at any one of the established agricultural schools at a charge of 6d. per sample, with a reduction of 25 per cent. for ten or more samples sent in one consignment. Postal and railage charges on samples must be prepaid by the sender. It would not cause the dairyman much trouble or loss of time to take the weight of milk yield from each cow in his herd once in two weeks, or even once in a month, and forward samples to the nearest agricultural school for a determination of the butter-fat content.

# Some Points on Karakool Sheep Farming.

By M. KARPOV.

*(Translated from the Russian by S. Meyerson, Pretoria.)*

## INTRODUCTION BY THE CHIEF OF THE SHEEP DIVISION.

SEVERAL months ago the Department received inquiries for information regarding Karakool sheep and their possible suitability for introduction into the Union, and the following notes have now been translated from a Russian bulletin by Mr. M. Karpov, who visited the principal places where this class of sheep is bred in the spring of 1910. Mr. Meyerson is mistaken in believing that nothing has been heard in the Union of the experiments being carried on in German West Africa, for it was after being informed that these were being undertaken that the Union Government decided to seek further information regarding Karakools, and the bulletin he has translated is the fruit of this Department's inquiries.

When this breed was first suggested as a possible acquisition to the pastoral industry of the Union it was thought it might (if introduced) possibly acclimatize itself to the drought-ridden districts of the north-west Cape, and it is considered that if experiments are to be undertaken that is the most likely country for Karakools to

thrive in. The diverse conditions of our climate must not, however, be overlooked, and it must be borne in mind that in South Africa these sheep would be called upon to contend against the hot tropical sun—a likely consequence of which would be the degeneration of the fur into a hairy fleece, somewhat akin to that possessed by Africander sheep. Mr. Karpov points out that when Karakool sheep were tried in the Province of Poltava and in the Crimea degeneration followed in the third and fourth generations, and a like result might occur if they were imported into South Africa.

The Government has under consideration at the present time the improvement of the Africander sheep, and pending further information it certainly could not undertake to experiment with this new breed—at all events until all attempts to make a success of the local breed have failed. Should any farmer desire to experiment at his own expense the Department would endeavour to arrange for the purchase of the stock to the best advantage. It is obvious, having regard to the paucity of the information available, that these experiments would need to be carried out on a very limited scale until the ability of the Karakool to contend against sub-tropical conditions has been fully established.

B. ENSLIN,
Chief, Division of Sheep.

## TRANSLATOR'S PREFACE.

THIS pamphlet, written by a Russian for Russians, and forming in the main an appeal to the Russian Government and public at large for more attention to Karakool farming, naturally contains much that is of little or no interest to the reader in this country and lacks, perhaps, more that would be of vital interest to him. Some passages, moreover—as, for instance, those on the genetics of the Karakool sheep—may be quite superfluous for the ordinary reader, and at the same time too short for the expert in sheep breeding, so that they may be of no use to anybody. Another drawback of this compilation consists in the fact that various bits of information on one and the same point are not treated coherently under one heading, but are scattered throughout the little work by a method, or lack of method, which may sometimes tax the patience of the reader. But in spite of all these defects, to which that of a highly involved style must be added, the perusal of the pamphlet may prove well worth the trouble.

Not being a farmer myself I cannot venture an opinion as to how far an attempt to import and establish Karakool sheep in the Union of South Africa would be warranted on the information concerning them which is contained in the following pages. But I may be allowed to point out one great advantage of these sheep that should be carefully considered by every sheep farmer—namely, their practical immunity from losses through drought, for in their case the dreaded question of cutting the throats of lambs in order to save the ewes can never arise, since it is for that same action, i.e. for the purpose of obtaining the skin from the lamb before it is many days old, that these sheep are mainly kept.

There is, of course, the question whether one lambskin in the year would bring the farmer the same return for his investment and work as, for instance, one year's wool of a sheep brings him at present, but, though there is little doubt about it in my own mind, I will leave the decision on this point to the reader.

Although it would be interesting to know why nothing (as far as I know) has been heard in the Union of the experiment which, as would seem from a few remarks by the writer, was made in Damaraland to acclimatize Karakool sheep there, the main conditions for an all-round success with them in this country seem to be the provision of proper pedigree stock and a dry climate. As neither of these conditions seem to me to present any great difficulty, I hope that by this translation I shall have the good fortune to have contributed to some extent to an increase of the productivity of the country of my adoption.

S. MEYERSON.

Pretoria, 23rd July, 1913.

## KARAKOOL SHEEP FARMING.*

THE little skins of the Karakool lambs (the so-called Karakools, Karakool lambskins, or Khiva skinlets) occupy, thanks to qualities peculiar to themselves, an altogether exceptional place on the fur market of the world. They appear to be the only kind of fur which is used in all civilized countries, and that is worn by persons of both sexes of all classes, means, and ages. By virtue of their qualities, principally their beauty and durability, combined with relative cheapness of price, the Karakool skins have come into general household use, and therefore no changes of fashion can bring about any great fluctuations in the demand for Karakool skins. These lambskins of universal use appear to be nature's gift to almost only one relatively small oasis in Turkestan.

So far, the only place in the world producing this black rose (the word "Karakool" may be translated "black rose" or "black lake") of the lambskin industry is the Khanate of Bokhara, and its principal trade centre the annual fair in Nizhni-Novgorod.

It must be remarked, in reference to the general position of Karakool sheep farming, that in the last few years a growing interest

*NOTE.—For the transliteration of Russian and other foreign names in this pamphlet the following rules have been adopted:—

1. Consonants which denote the same sounds in English and in Dutch have been used for the same sounds in the foreign words. The "j" and "w" (also the "q") have, therefore, not been used at all.

2. Sounds denoted variously in these languages have been rendered by compound consonants, thus:—

"zh" denotes the sound of the "s" in the English word "leisure";
"sh" denotes the sound of the "sh" in the English word "show";
"kh" denotes the sound of the "ch" in the Dutch word "wachter."

NOTE.—"g" sounds always as "g" in the English word "garden";
"y" sounds always as "y" in the English word "yard."

3. The vowels a, e, i, o, denote the same sound as in Dutch, and "oo" sounds the same as the "oo" in the English word "boom" or "room."—TRANSLATOR.

in this branch of the lambskin industry has greatly manifested itself, brought about, as it seems, by an increasing demand both for the skins and for the sheep themselves as breeding stock.

The increased demand has produced an excessive rise in price, but has in no way resulted in measures being taken for the protection, support, and propagation in Asia and the south of Russia of this profitable breed of sheep.

Thus the price of Karakool lambskins has risen in the last fifteen years by 180 per cent., while stock ewes and rams, which formerly, according to returns supplied, were valued at from 6 to 16 roubles, are now sold at from 16 to 60 roubles (which the writer of this had to pay himself).

It is very important to observe that the western nations, who only comparatively lately have come to know of the Karakool breed of sheep (mostly through rare photographs and zoological gardens), are now sending out expeditions after this highly valued stock, studying it in its native land and in their own countries, and are now even establishing breeding stations in Africa and in America. In the motley crowd of the lambskin bazaars of Old Bokhara, where formerly buyers from the west were never seen, now one frequently meets Europeans.

A growing interest in Karakool sheep can also be expected in the future, principally in consequence of the specific qualities of their skins, and partly as a result of the marked decrease in the supplies of fur from wild animals and its great rise in price—without considering the increase in numbers of the human race.

To the same extent, however, as the growing interest of the west in Karakool sheep may be profitable for the Khanate of Bokhara at the present time, it may also be fraught with bad prospects for Russia in the future, since the search for "new pastures" for the Karakool sheep in the African Colonies or in America may in favourable circumstances produce competition in the Karakool business, while the direct buying of the skins by foreigners in the fairs of Bokhara itself, so frequently observed in the last few years, may deprive Russia of its Karakool market of Nizhni-Novgorod. These dangers in the future, and the existence of a whole series of causes connected with the economics of the industry and the breeding of the sheep, point to the urgent necessity for the adoption by Russia of measures for preventing the decay of its Karakool market and for promoting a broad development of this branch of stock-breeding in its own territory.

The promise of success for such an undertaking can be seen, on the one hand in the favourable conditions of a portion of our country, which as regards soil and climate are very similar to those prevailing in the home of Karakool sheep farming, namely, the neighbouring territory of Turkestan; and on the other hand in the interest which has lately been manifesting itself in the long-forgotten peasants' sheep farming, which, though the decay of the fine-haired variety is natural in Russia, has some tendency to develop, and in some places at least to improve. It is evident that in southern and south-eastern Russia the Karakool lambskin industry, interest in which has been aroused by communal organizations and by the Agricultural Department, could be widely developed side by side with the breeding of coarse-haired varieties.

I shall now pass on to a more detailed treatment of the present position of Karakool farming, beginning with a description of Karakool sheep, their upkeep and value, and concluding with the position as regards the disposal of the products of these sheep, at the same time also touching upon the desirability of adopting measures in the interests of this branch of stock-breeding.

As in Russian literature there are only a few works (more often of an incidental character) on Karakool sheep, I shall endeavour to confine myself to those aspects of this branch of stock-breeding that have either been but little cleared up by other writers or have not yet been touched upon at all in previous works.

The species of Karakool sheep must on the basis of a series of data be considered as one of great antiquity. An authority like Duerst*, in his recent interesting work, describing in detail the earth layers in Turkestan and beginning with the year 8250 B.C., sees in the Karakool sheep a remnant of the ancient fossilized species of the "Anau," so called after the town of this name. But in spite of their ancient origin, in the description of no other species of sheep does one find such indefiniteness as in the description of the exterior characteristics of the Karakool, especially when some particular feature is in question. Writers who often agree in a general description of this species as often differ in the description of some particular feature. Speaking of the ears, for instance, some describe them as long and thin, others as short and thick; and the same is the case in regard to the length of the tail, the colour of the wool, white spots, etc. From this it is clear that the Karakool sheep does not represent a definitely developed species possessing an exact standard like certain English and other species. Of this careless management of their breeding by the Bokharians I had occasion to convince myself, when in the spring of 1910 I visited all principal Karakool regions in the Khanate of Bokhara. Making myself in this way acquainted with the methods of breeding over a very large area in the Districts of Bokhara, Karakool, Karshi, Tshardjui, Kerki, and others, I never met any ideally pure Karakool herds. These herds more often represent a motley mixture of various groups of Karakool, Kirgiz, Koord-Afghan, and other sheep, with a predominance of Karakool rams. Naturally, in view of the careless and irrational conduct of breeding by the natives, it is difficult to expect any serious cultural results.

Observing how the slow-going semi-civilized Bokharian thus carries on his sheep farming, whilst his principal aim is being attained and people are beginning to pay him comparatively high prices for his lambskins, it is needless to speak of what he has done in the past. This, I think, explains some of the differences in the description of the exterior of the Karakool sheep by different writers; and quite natural appear reports such as, for instance, the one by I. Ivanieff regarding the Karakool sheep obtained by him from Bokhara, namely, that "according to their exterior they were not of one uniform type." Still, the grey antiquity of the Karakool sheep in Asia goes to show that they must form a distinctive race, with the power to impart their characteristics to their offspring. In general this is confirmed, for as a matter of fact they do impart their elementary characteristics fairly persistently in the first generations at least. If, however,

*J. U. Duerst, "Animal Remains from the Excavations at Anau by the Pumpelly Expedition of the Carnegie Institution."

while preserving the more essential parts of their exterior, they sometimes differ in some less important features which are not constantly imparted to the progeny, this would rather indicate a lack of culture of the species itself, showing that it does not possess the exactly fixed features of a cultivated species.

Considering the Karakool sheep broadly from the point of view of genetics, even with the little knowledge which we so far have about their crossings with other native species, and trying to analyse their "individual characteristics," we should expect in the progeny of the first crossing a prevalence of Mendel's so-called "dominant marks" peculiar to Karakools, and that some characteristics of non-Karakool sheep, disappearing in the first generation of the hybrids, may afterwards reappear in the later progeny as "recessive marks." With the mestization (crossing) of the native Karakool sheep existing, as is seen in Bokhara, various individuals of these are the bearers of different hybrid and constant characteristics, and in this way the exterior of the Karakool sheep does not appear well defined.

Not repeating, therefore, any of the existing descriptions of the Karakool sheep, I may be allowed to dilate to some extent on their various kinds, and only on particular points of the exterior of the species.

I. V. Sinitsin in one of his special treatises* distinguishes, if I may say so, two sub-species, two types of the Karakool sheep, and gives corresponding descriptions of them. S. V. Ponyatovski mentions, without, by the way, giving any description, four types of Karakools, calling them respectively Dooz-bai, Shirazi, Arabi, and Tsigai. Being aware of these views held by writers, and of their division of the Karakool sheep into particular types, I endeavoured in the home of the Karakool to clear up this question as far as possible on the spot.

Travelling about the Khanate of Bokhara during a period of three months I had occasion to make myself acquainted with the principal sheep districts there. I had occasion to inspect a great number of herds, beginning with the Karakool Oasis, the traditional rallying point of all visitors, and ending with an almost unknown locality, the steppes of Dzhom-Bos, Sorkhe, and others, where, as far as can be gleaned from writings or the information of natives, no Russian or European buyers have ever been seen before. Nowhere did the Karakool herds leave the impression of being thoroughly pure. Usually one sees Karakool sheep of various strains run together with Koordish and Afghan sheep, and also with bastards of Karakools and the latter. Looking at the Karakools alone in such a neglected mixed group, containing, as it does, a considerable percentage of bastards of various generations, one cannot fix on any particular types of that species standing out sufficiently sharply to the eye. So inconstant and rather blurred (showing in some specimens transitory forms) do a few characteristic marks appear that one does not obtain a conception of a well-defined characteristic group of Karakools from their outer appearance.

Nor do the native herd proprietors themselves know anything of a division of their sheep into types, and my attempts to find help from more intelligent native breeders in this designation of types usually led to nothing.

* The Krim Sheep "Malitsh" and the Bokhara Karakool "Arabi."

Finally it appeared that the above-mentioned terms were far from being known everywhere, and had merely a local meaning. So, for instance, is the designation "Tsigai" given by S. V. Poinatovski undoubtedly of such a (local) character, because the kind of sheep so called occur only in one district; while the term "Shirazi," mentioned but not explained by him, merely defines any kind of Karakool sheep of a grey colour (evidently of mixed origin). Sinitsin's division into two types, indefinite though it is, could yet partly be discerned; more readily, however, could one in an ordinary collection of a more frequent type—called by Sinitsin the "second," and Dooz-bai by the natives and also by Poinatovski—pick out, though comparatively seldom, a kind of sheep of a smaller type—the so-called "first" by I. V. Sinitsin. It should be observed here that the small ear, peculiar to this type, according to Sinitsin, could sometimes also be found in a group of his "second" type, and the same contradiction is also met with in his description of the tail of both types.

The second type, in opposition to the first, which is alleged to be "pure," I. V. Sinitsin considers as a mixture with Koordish sheep. But describing this type, in speaking of the tail he points out that it has "an S-shaped end reaching almost to the ground."

Personally I was able to convince myself that sheep of a type similar to the one described often possess a tail which not only "does not reach almost to the ground," but on the contrary is somewhat short, and sometimes does not even reach the hock. This, by the way, is only what must be expected if one is to explain the descent of this type as I. V. Sinitsin explains it himself, namely, as a mixture with Koordish sheep, which, as it is well known, have only a stump for a tail; otherwise there would be the anomalous case of inheritance of a very long tail by the progeny of two species, the one of which has a short tail and the other almost no tail at all. The explanation of the descent of these sheep from a second more frequent species, the so-called Afghan species, also helps very little, because these sheep, too, have only a short tail.

In the mestization of Karakools with sheep which have almost no tail at all, the exterior of the bastards of even the first generation is so marked on the side of the Karakools that it may be assumed that an impure origin of the progenitors would sometimes produce in the progeny a short tail inherited from some other crossed kind. This circumstance has partly induced me, when making purchases in Bokharian herds, the proprietors of which could usually not furnish a guarantee of purity for stock sold by them, to decide, other conditions being equal, on sheep rather with a long tail reaching at least to the hock or still lower, than on the contrary. Thus the distance from the ground to the hock of more typical Karakool rams measured by me was equal to 37 per cent. of their height to the top of the shoulder, and the distance of the end of the tail from the ground 32 per cent. in the same proportion; with ewes these proportions were with fluctuations 40 per cent. and 31 per cent. respectively. Since, as far as I know, exact measurements of Karakool sheep have not yet been made, I give them here for the sake of better knowledge of the more constant features of Karakool sheep.

Considering the effort of the above-mentioned writers to classify Karakool sheep into separate types as a hopeless task, since the apparent variants of quasi-subtypes are neither constant nor

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TABLE 1.

| Sex and No. | Age according to number of Permanent Incisors. | Height to top of Shoulder. | Length from Shoulder Joints to Tail. | Height to Hipbones. | Depth of Chest. | Circumference of Chest. | Width of Chest. | Width of Back. | Height to Hock. | Distance of end of Tail from Ground. | Length of Head. | Line of Profile. | Width of Jawbones. | Width of Hipbones. | Horns. Inner Length. Outer Length. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Rams:* | | cm. | % | % | % | % | % | % | % | | | | | | cm. |
| 1 | 2 | 72 | 91·0 | 101·4 | 45·9 | 126·4 | 26·4 | 24·3 | 34·7 | 39·6 | 33·4 | 44·4–133·3 | 10·4–31·3 | 11·1–33·3 | 64–29 |
| 2 | 2 | 71 | 95·8 | 102·8 | 47·9 | 128·2 | 24·6 | 25·3 | 35·2 | 29·6 | 33·3 | 43·6–129·2 | 10·6–31·3 | 11·9–35·4 | 45–19 |
| 3 | 2 | 69 | 105·6 | 102·9 | 42·7 | 121·7 | 27·5 | 26·1 | 39·1 | 27·5 | 31·9 | 39·1–122·7 | 12·7–38·6 | 13·1–40·9 | 42–21 |
| 4 | 4 | 68 | 102·9 | 104·3 | 45·6 | 119·1 | 27·2 | 23·4 | 39·6 | 36·8 | 35·3 | 41·2–116·6 | 11·0–31·3 | 13·2–37·9 | 47–25 |
| 5 | 4 | 75 | 96·0 | 100·0 | 49·3 | 126·6 | 26·6 | 23·3 | 36·0 | 32·0 | 33·3 | 40·0–120·0 | 10·7–32·0 | 12· –36· | 53–26 |
| 6 | 6 | 74 | 91·2 | 101·3 | 43·2 | 121·9 | 28·4 | 23·6 | 38·5 | 29·8 | 32·4 | 38·5–116·6 | 11·5–35·0 | 12·2–37·5 | |
| *Ewes:* | | | | | | | | | | | | | | | |
| 7 | 2 | 66 | 96·9 | 96·2 | 42·4 | 125·8 | 27·3 | 23·5 | 40·9 | 31·8 | 33·3 | 40·9–122·7 | 11·3–34·1 | 12·1–38·6 | Hornless. |
| 8 | 4 | 67 | 94·0 | 97·0 | 43·3 | 120·9 | 27·6 | 23·9 | 40·3 | 23·3 | 32·8 | 37·3–113·6 | 11·9–36·3 | 12·7–38·6 | |
| 9 | 6 | 66 | 101·7 | 100·0 | 42·4 | 125·7 | 27·3 | 26·1 | 40·9 | 37·3 | 33·5 | 35·1–104·4 | 11–9–35·5 | 11·9–35·5 | |

characteristic,* I have not chosen for my measurements the various types pointed out as such by writers, but have tried to pick in general the more frequently met with and characteristic Karakool sheep. This, if preferred, could be regarded, with reservations, as Sinitsin's "second type" or as the family Dooz-bai.

For a more exact determination of constant points of the body, the sheep were measured after shearing. All measurements—with exception of those of the width round the chest, the line of profile, and the curvature of the horns, which were taken with a tape—were made with a pair of compasses and a rule. In the following table only the height, as a basic measurement, and the length of horns, are given in centimetres. All the other measurements are given, for better perspective, in percentages in reference to the basic measurement—the height.†

The double figures for the measurement of the head give the percentage relation to the basic measurement and also to the length of the head itself.

The two rows of figures for the length of the horns define the absolute length of their curvature on the outer or longer side, and on the inner or shorter side respectively. By the way, it must be remarked that I did not find in the Khanate such a high percentage of horned ewes as the 30 to 40 per cent. mentioned by Sinitsin. I have not made any special calculation of them on the spot, but on general observations I believe that that percentage ought to be reduced by more than half and taken in a round figure of ten. An indirect confirmation of this could be found in a description by I. Ivanaiev of the herd of the Ural school, in which amongst about 500 ewes there was only one with horns.

* Even if it should be possible with some trouble to separate out a so-called "Arabi" strain, it could hardly be done always with the certainty that it really is a particular type.

† The choice of the length as a basical measurement would have been less advisable, since it is comparatively more difficult to determine it, on account of the fatty (tail) layers.

*(To be continued.)*

# The Wheat Louse (*Toxoptera graminum*).

By W. Moore, B.A., Lecturer in Entomology and Zoology, School of Agriculture, Potchefstroom.

(*Continued from page* 492.)

## Natural Control of the Wheat Louse.

It has been estimated that, starting with a single female wheat louse at seven days old, the progeny of this single individual (barring all accidents which would destroy the lice before their natural death) would amount in one month to 15,794, in two months to 107,314,398, in three months to 731,186,744,814, and in four months to 5,019,680,715,382,100.*

It is readily seen, therefore, that unless the wheat louse had some natural control, there would not even be a hope of growing any cereals. Such control is found in the form of a number of insects. These insects may be divided into two groups, namely, parasitic and predaceous insects. The first group destroys the louse by laying an egg inside its body, which egg hatches into a minute grub which destroys the louse. The predaceous insects feed on the wheat louse, either eating it completely or sucking out the juices from the body. One larva of a predaceous insect will destroy many plant lice, while a larva of the parasitic insect destroys but one plant louse.

## The Parasite of the Wheat Louse in the U.S.A.

A very small wasp (*Aphidius testicaepes*) is found in America which successfully controls the wheat louse. It is only when this parasite is not present in the field, or when the temperature is too low for the rapid reproduction of the parasite but not low enough to effectively check the breeding of the wheat louse, that serious injury is accomplished by the louse. When the aphis migrates north, it often happens that there are not a large enough number of the aphis containing parasites with the migrants to effectively control them in the new field until after they have done considerable damage. It may also happen that none of the migratory forms contain parasites, and as the adult parasites are smaller than the aphis, they cannot migrate so rapidly. The result is a field with the lice present in destructive numbers, and with no insect to control them. This always means a severe outbreak of the louse.

## The Parasite of the Wheat Louse in South Africa.

Several species of aphidius occur in South Africa, and at least one species breeds in the wheat louse in the field. A number of experiments were carried out with different species of aphidius during the year, and specimens of the different species have been sent to Mr. F. M. Webster, of the U.S.A. Department of Agriculture. The

* "The Green Bug and its Natural Enemies." S. J. Hunter, University of Kansas.

determination of these has not yet been received, but Mr. Webster states that at least one species seems to be identical with a species occurring in the United States.

The female parasite is somewhat smaller in size than the wheat louse, and has the wings folded flat over the back. It has long antennae, and is generally black in colour. The parasite can be seen walking about over the leaves of infected plants seeking the lice. When the parasite finds a louse, it places the tip of its antennae upon the body of the louse, and then, bending the abdomen forward between its legs, it inserts an egg within the body of the louse by means of its sharp ovipositor. It then seeks another louse to "sting," continuing until all its eggs are laid. It lays but one egg in a louse, but if the lice are scarce it may happen that more than one egg is laid in the same louse. Under these conditions only one egg develops. If the lice are very few it may happen that the parasite will "sting" the lice to death. The egg of the parasite develops into a little grub which, during the summer time, kills the louse in a matter of about five or six days. If it is an adult louse which has been "stung," it may continue to produce young for about three days; the total number of young produced by such a louse in the insectary was twelve. If, however, it is a young louse which has been stung, say, just after it has moulted for the first time, that louse, although it will reach the adult stage before dying, will never produce any young.

When the aphis dies it becomes swollen and of a light brownish or straw colour. Inside the dead body the larva of the parasite pupates. When about to emerge, it cuts a circular hole in the back of the louse through which the adult makes its way out. This, in the summer time, is usually about twelve days from the time the egg is laid in the body of the louse. About 300 to 400 eggs are laid by one female parasite, and, making allowance for cases where two eggs are laid in one louse, it would be safe to give 300 as the number which actually develops. In the insectary the maximum number developed from one female was 286, but, under field conditions, the parasite is not so apt to lay two eggs in one louse.

Both male and female parasites occur, and if the female has been fertilized by the male her offspring consists of about 70 per cent. of females. From actual experiment it was found that one male could fertilize two females, and it may be possible for a male to fertilize more than two females. If, however, the female is not fertilized, she can still lay eggs which will develop, but the offspring of these eggs will show a perentage of about 70 males, thus bringing up the percentage of males in the field. Even a female of second generation is able to lay eggs without being fertilized, but, under these conditions, the offspring is practically all males.

The parasite has wings and can thus spread from field to field, but, being smaller, it is not able to proceed as fast as the wheat louse. Winged forms of the wheat louse containing the egg or the larva of the parasite, may fly with the swarm and thus introduce the parasite in the new field.

Other species of aphides are destroyed by species of aphidius, and a number of experiments were tried to find out from what species of aphis parasites could be bred which would breed into the wheat louse. From these it was found that the aphidius bred from the green peach aphis would breed into the black peach aphis, but not

into pea aphis, and although it would "sting" the wheat louse, few developed to the pupal stage and even less emerged. In one experiment forty-one parasitized forms were obtained while only five adults emerged, and in another twenty-three parasitized forms were obtained, but only nine emerged. In several other experiments from two to six parasitized forms were obtained, but no adults emerged. The aphidius bred from the wheat louse, however, would breed freely into the green peach aphis, the black peach aphis, the cabbage aphis, and the dark green aphis found upon Kaffir corn, but would not breed in the shiny black citrus aphis, the pea aphis, or into the large grey willow aphis (*Melanoxantherium* sp.). Aphidius bred from the yellow aphis on wild cotton (*Asclepias* sp.) readily bred into the wheat louse, as was also true of aphidius bred from the reed aphis, the dark green aphis, and the cabbage aphis.

An attempt was made, with the assistance of Mr. F. Wacher, the Agricultural Officer of Basutoland, to introduce the parasite into a field where the wheat louse was found without the parasite present by placing leaves of cabbage infested with parasitized cabbage aphis in the field. The parasites emerged and were seen "stinging" the wheat lice and parasitized forms appeared. Some of the parasitized forms were bred out, but the experiment was not successful, due to the ladybirds present in the field, which ate up all the aphis and parasites completely, clearing the field before the parasites had a chance to become established.

From these experiments it seems that during the year when the wheat louse is not abundant in the field, the aphidius is able to breed in certain other species of aphidides which are abundant. At times during the summer the wheat louse may become abundant on certain grasses, but it is never very long until the aphidius finds them out and breeds in them. It may be of value in some cases to introduce species of parasitized aphis of a different species into the field, thus introducing the parasite, but such is not true in most cases as will be seen later.

### THE BLACK-SPOTTED LADYBIRD (*Adalia flavomaculata*).

Of the predaceous insects which destroy the wheat louse, the most important is the black-spotted ladybird. This ladybird is yellow or reddish in colour marked with black spots, as shown in the illustration. In length it is about one-fifth of an inch and about an eighth of an inch in width. The eggs are elliptical in shape, about one-thirty-second of an inch in length, and arranged on the leaf in upright clusters. Under favourable climatic conditions the eggs turn dark in colour about the fifth or sixth day, and hatch in from five to seven days from the time they are laid. The newly hatched larvae feed for a short time upon the egg shells, but soon begin feeding on the lice. The larva is of a dull black or steel bluish black, marked with whitish spots down the middle of the back and brownish spots on the sides of the first abdominal segment. When full grown they are from one-quarter to three-eighths of an inch in length. The larvae stage lasts about ten to thirteen days, during which time they eat about 320 wheat louse per larva, an average of about twenty-six to twenty-eight lice per day. The larvae when full grown passes into the resting or pupal stage. At this time they attach themselves to the surface of the leaf or stem

by the tail end and hump up their body. Soon the last larval skin is partly shed, exposing the yellow and black pupa. The pupal stage lasts about eight days, when the adult ladybird emerges and begins feeding upon the lice. These adults at first are light yellow, marked with black, but later assume the reddish colour.

The adult ladybirds, although they copulate frequently, do not lay eggs until about thirty to thirty-five days from the time they emerge from the pupa. During this time, however, they are busy feeding upon the aphis, eating on an average 825 lice during this period, which is about twenty-five lice per day to each ladybird. About 100 to 150 eggs are laid by each female, covering a period of about a week to ten days. This species does not seem to have a second egg-laying period, but they live for some time after egg laying, during which period they continue to feed upon plant lice. The adult stage of the black-spotted ladybird is on the average about three to four months, the males dying first. The records obtained from one experiment, the larvae of which were hatched from the eggs on the 10th October, 1912, showed an average number of lice destroyed in the complete life of the one ladybird as 2844. The last ladybird in this experiment died on the 24th February, 1913. In this experiment the ladybirds were given as many aphis as they would eat. Where the lice are scarce the ladybirds would not pass as rapidly through the different stages, and the number of eggs laid by the adults have a direct bearing upon the quantity of food present. If the food supply runs short, the eggs which have already been laid will be eaten, while even the larvae will eat each other, or the adults may eat the larvae. When the supply of a certain species of aphidides becomes very low, the adults leave the field and seek out other places where aphidides are present in numbers. The larvae, on the other hand, cannot do this, not being able to fly, so they feed upon each other, and, finally, the last ones die of starvation.

### APHIS UPON WHICH THE BLACK-SPOTTED LADYBIRD WILL FEED.

The black-spotted ladybird does not feed upon the wheat louse alone, but also on a large number of other species. This enables it to pass successfully through periods when the wheat louse is very scarce, such as in the summer time, or when it has been greatly reduced by its natural enemies in the spring of the year. The ladybird feeds commonly upon the black chrysanthemum aphis, on chrysanthemums; the green peach aphis on peaches, cabbages, etc.; the black aphis on peach; the melon aphis on melon plants and cotton; the dark green aphis on grasses, such as the wheat louse is found upon; the pea aphis on peas; the lucerne aphis on lucerne; the green aphis on reeds; the black citrus aphis on citrus trees; a black aphis on beans; black aphis on yellow dock; the yellow aphis on wild cotton; and also the rose aphis on roses, although it usually does not feed upon this aphis in the fields.*

* Black chrysanthemum aphis (*Macrosiphum sanborni*).
Green peach aphis (*Myzus persicae*).
Black peach aphis (*Aphis persicae-niger*).
Melon aphis (*Aphis gossypii*).
Dark green aphis (*Aphis* sp.).
Pea aphis (*Macrosiphum pisi*).
Lucerne aphis (*Macrosiphum* sp.).

RED-SPOTTED LADYBIRD (*Chilomenes lunatus*).

The red-spotted ladybird, or the red ladybird, is one of the most common of the ladybirds found in South Africa. It is a large species, about 3-10th of an inch in length, and nearly as wide as long; hemispherical in shape, and varies in colour from a bright yellow to a bright red. The yellow or red is arranged in spots surrounded by a network of black, as shown in the illustration.

The adult female lays about 150 to 250 eggs during her life. The eggs are a little larger in size and are a deeper yellow or orange colour than those of the black-spotted ladybird, but in shape and arrangement they are the same. Under favourable climatic conditions, i.e. a mean temperature of 65° to 70° F., the eggs assume a dark almost black colour on the third day, due to the young larvae showing through, and hatch towards the close of the third day, or early on the fourth day.

The larval life is the same as for the preceding species. The larva is dull black in colour, marked with white or very pale yellow spots, as shown in the illustration. They grow rapidly and reach their full size in about ten days. Being larger in size, as might be expected, they eat more lice than the larva of the black-spotted ladybird. Each larva in its ten days eats about 440 aphis, an average of forty-four aphis for each day. The pupal stage lasts for about eight or nine days. It is similar to the pupa of the black-spotted ladybird, but larger in size, and contains more yellow, the wing pads being quite yellow.

The adults when they first emerge from the pupa are bright yellow without any of the black markings, but during the first day the black pattern makes its appearance. The ladybird is then yellow and black, but as it becomes older, it slowly assumes the reddish colour. They copulate, and in about twenty-five to thirty days from the time they emerge from the pupal stage the first eggs are laid. The egg-laying of this species is extended over a longer period than is the case with the black-spotted ladybird, and in some cases there seems to be two distinct periods of egg-laying with nearly a month intervening. The adults eat more aphis per day than the black-spotted, but no exact records were taken during the summer. The black-spotted ladybird probably eats only about three-quarters as many as does the red-spotted ladybird. The normal life of the red-spotted ladybird is much longer than that of the black-spotted ladybird, being about four to six months. On the whole, therefore, the red-spotted ladybird destroys more wheat lice than the black-spotted ladybird, and especially during the summer time; it is by far the most common species found about Potchefstroom.

The red-spotted ladybird feeds upon all the different aphidides mentioned under the heading "Black-spotted Ladybird," and in addition to these, it is found feeding upon the woolly aphis or American blight of apple trees (*Schizoneura lanigera*)—it will be found feeding upon the black citrus aphis more frequently than the black-spotted ladybird.

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Green reed aphis.
Black citrus aphis (*Aphis* sp.).
Black bean aphis (*Aphis* sp.).
Black aphis on Dock [*Aphis rumicis or carbocolor* (?)].
Yellow aphis.
(Rose aphis (*Macrosiphum rosae*).

### THE BLACK LADYBIRD (*Exochomus nigromaculatus*).

The black ladybird is smaller than either of the two preceding species, being about 3-20th of an inch in length. It is shiny black in colour, except the sides of the thorax, which are yellow, but the yellow is not often noticed unless the ladybird is closely examined. Due to this yellow colour, this ladybird is sometimes called the yellow-checked ladybird.

The black ladybird lays yellow elliptical eggs which are a little smaller in size than those of the black-spotted ladybird. These eggs are, however, arranged on the leaf in quite a different manner than those of either of the preceding species. Instead of being arranged upright on end, they lie on their sides arranged in a manner similar to a cord of wood. In about seven days these eggs hatch. The larvae are greyish brown or yellowish grey in colour with four rows of black branched spines down the middle of the back, while there is a row of similar spines on either side of the body. The larval stage lasts about fourteen days, and they eat about as many aphis as does the larva of the black-spotted ladybird. The pupa is dark or black, partly surrounded by the last larval skin. It lasts about seven to ten days. The adults live for about fourteen to thirty days before they lay eggs. The exact age of the adult when it dies was not worked out, but from the records of several experiments it would seem to be about five or six months, or even longer. The adult ladybird feeds upon the aphis, but does not eat as many per day as does either of the other ladybirds. The reason for this is probably its smaller size. The black ladybird has the egg-laying period extended over a long period, and often eggs are laid in several distant periods, as was the case with the red-spotted ladybird.

The black ladybird is distributed over a very large area of Africa, and is even reported from the Soudan. It feeds upon a larger variety of insects than the other species. In addition to the various aphidides mentioned under the heading "Black-spotted Ladybird," the woolly aphis, mealie bugs of several different species (*Pseudococcus* sps.), and other scale insects might be added.

### THE ORANGE-SPOTTED LADYBIRD (*Scymnus casstromi*).*

The orange-spotted ladybird is smaller than the black ladybird, being only about 1-10th of an inch in length. It has two small orange-coloured spots on each wing cover. The larva of this ladybird is small and is covered with white waxy filaments, which gives it the appearance of a mealy bug.

The orange-spotted ladybird is of practically no importance as a control of the wheat louse, as it appears late in the season, generally about January, but is sometimes found feeding on the wheat louse when it returns to the grain in March. This ladybird is generally found feeding upon the yellow aphis on "wild cotton," and the melon aphis on melons and cotton, and on several species of scale insects. As it is so rarely found on the wheat louse, no experiments were undertaken to ascertain its life history.

* Determined at the Transvaal Museum, Pretoria.

*(To be continued.)*

# The Tall Fescue Question.

## SOME INTERESTING CORRESPONDENCE.

During the past few months farmers have been much troubled by the publication of reports dealing with New Zealand experience of tall fescue, and many have seriously questioned the desirability of continuing the cultivation of this grass in South Africa. Out of much correspondence that has taken place, the following letters have been selected as indicating the position. Particular attention is directed to the letter from Dr. Cockayne, the Biologist of the New Zealand Department of Agriculture:—

I.

To the Secretary for Agriculture, Pretoria.

Tall Fescue.

Sir,—May I be permitted to ask what your Department is doing:

1st. With regard to the desirability of continuing the cultivation of this grass in the face of New Zealand experience?

2nd. Whether your Department is taking steps to ascertain if ergot is being introduced with the imported seed?

3rd. Whether the seed grown from grass grown in this country bears ergot?

4th. Will your Department publish as soon as possible the results of any investigations for general information?

I enclose a cutting from the *Farmer's Weekly* with reference to tall fescue which may not have been brought to your notice, and which will elucidate the cause for the above inquiries.

The situation with me is this: Three to four years ago I put down an area totalling about 20 acres; unlike all other grasses it has not faded away with time, and is the only one of them all that answers the requirements of this locality, so that I was about to increase the area to 200 acres, not only so, but I have distributed seed to others and have included in my orders seed for others. The evidence of its dangerous nature in New Zealand is therefore very disquieting and may be the cause of my altering all my plans.

How is ergot to be detected in the seed of the plant?

Hoping for an early reply.—Yours, etc.,

T. M. C. Nourse.

P.O. Box 37, Volksrust, 8th September, 1913.

II.

To the Editor of the *Farmer's Weekly*.

Sir,—*In re* the controversy on tall fescue appearing in your columns a short time back, and with special reference to the article taken from a New Zealand farmers' journal, I have much pleasure in enclosing a letter for publication, if you think fit, in answer to a letter I wrote enclosing the cutting above referred to.—I am, etc.,

A. Kay Hards,

Assistant Government Agriculturist, Cathcart, Cape Province.

[ENCLOSURE.]

SIR,—In answer to your letter of 9th June in regard to the above (tall fescue), I beg to inform you that this grass was once esteemed very highly in New Zealand. It was sold in the North Island of this Dominion under the name of "Napier" fescue at from 2s. to 2s. 6d. per lb. It was, however, very quickly found that it was one of the most undesirable grasses to have on the soil, and the owner of the property at Napier (in the North Island) from which it was sent out, found it necessary to expend a large sum of money to bring about its eradication. Wherever this grass is present, it becomes dominant on the land, and its seed heads are invariably the bearers of ergot. The losses of stock from this cause have been somewhat serious. It is but recently that farmers south of Manawatu (North Island) on the outside of the tall fescue area have made representations to the Government with the object of bringing this grass under the provisions of the Noxious Weeds Act. With this experience its increase would be deplored. At the same time, on poor lands, where it can be so controlled as to prevent the formation of seed heads, this grass may be useful, but wherever there is rich land or swamps this tall fescue becomes a serious menace.—I am, etc.,

E. CLIFTON,
Director of Division.

Department of Agriculture, Wellington, New Zealand.

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III.

T. M. C. NOURSE, Esq., Volksrust.

ERGOT IN TALL FESCUE.

DEAR SIR,—Your letter of the 5th instant has been passed to me by the Government Botanist.

With reference to the infestation of tall fescue with ergot (*Claviceps sp.*), I may say that this pest does not occur commonly in the grass in South Africa.

We have records of the occurrence of ergot on a number of other grasses, but only one instance of its occurrence on tall fescue.

No steps have been taken up to the present to ascertain whether it is being introduced with seed.

The ergot grains are quite easily detected, and if you care to submit a sample of any seed which you propose to plant we shall be pleased to examine it and report on it to you.—Yours, etc.,

E. M. DOIDGE,
for Chief, Division of Plant Pathology and Mycology
(absent on duty).

Pretoria, 15th September, 1913.

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IV.

J. BURTT-DAVY, Esq., Department of Agriculture, Pretoria.

DEAR SIR,—I enclose a cutting from the *Farmer's Weekly* of the 4th instant with regard to tall fescue, from which it would appear that its effect on stock is not good. I intended putting down a meadow

of this next season, and should be obliged if you would kindly let me know your views on the quality of the grass.

Thanking you in anticipation,—I am, etc.,

S. LEWIS.

Box 1261, Johannesburg, 17th June, 1913.

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V.

S. LEWIS, Esq., P.O. Box 1261, Johannesburg.

TALL FESCUE (*Festuca arundinacea*).

DEAR SIR,—With reference to the cutting on tall fescue from the *Farmer's Weekly* enclosed with your letter of the 17th. Before Mr. Burtt-Davy left for a six months' visit to England he wrote a note on this grass which will appear in the next issue of the *Agricultural Journal*. In this he points out that we have grown tall fescue for the last nine years at our Botanical Experiment Station, and there has been no indication that it will become a weed or that it is harmful to stock. Dr. Cockayne, Biologist of the Department of Agriculture, New Zealand, was written to and his reply, which was satisfactory, is included in this note. We have, however, written to him again on the subject, and on receipt of a letter from him will publish the information in the *Journal*.—Yours, etc.,

W. H. SCHERFFIUS,
Acting for Government Agrostologist and Botanist
(absent on leave).

Pretoria, 20th June, 1913.

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[ENCLOSURE.]

Department of Agriculture, Industries, and Commerce,
Biology Section.

The SECRETARY FOR AGRICULTURE, Pretoria.

DEAR SIR,—Your letter "B. 1631" of the 20th ultimo.

The tall fescue growing in New Zealand is really the reed fescue (*Festuca arundinacea*). It was introduced many years ago from Europe as a high class grass for wet swamps and was sown in many localities where the ground was heavy. On such soil it grows to an immense height, and produces herbage so harsh and coarse that stock will starve on it if there is no other food. The plants, of course, not being eaten down, seed freely, and the heads are often badly ergoted. Through it being used on the very class of land for which it is unsuited from a feeding standpoint of view, the very name tall fescue is anathema to the owner of swamp land.

On poor ground the reed fescue is really an excellent grass and could be used with great advantage, but the prejudice against it makes farmers chary of using it on any soils in New Zealand. *Wherever it is fed down there is no danger from the ergot*, as flowering being largely eliminated, very few ergot spurs are developed. *For your conditions I should think that the New Zealand reed fescue was an excellent grass, but it must not be used on heavy, swampy land.* The seed saved here this season is not of very high quality, and there is a good deal of chaffy seed about. In buying, your farmers would be well

advised not to buy seed that weighs less than 90 lb. per 6-bushels sack. There is a good deal that does not go more than 65 lb., and should really be well blown to remove the empty seeds before being used, or else a larger amount per acre sown.—Yours, etc.,

A. H. COCKAYNE, Biologist.

Wellington, 30th July, 1913.

# Laying out Lands for Irrigation.

By A. E. MILLS, Dohne, Cape Province.

[The following is an interesting contribution on the Laying Out of Lands for Irrigation, by Mr. A. E. Mills, of Dohne, Cape Province, for which the South African Irrigation Association has awarded the sum of three guineas. The attention of all interested is again drawn to this feature. The Irrigation Association is prepared to pay up to five guineas per approved contribution, the conditions having been previously stated. Although several very meritorious articles have been submitted, the secretary (Mr. F. D. MacDermott, P.O. Weenen, Natal) informs us that there is still room for something of a more comprehensive and practical character. This is what the association is aiming at—the placing on record of the results of the practical experience of the more capable irrigators of South Africa. With such an inducement there should be numbers of contestants.—EDITOR, *Agricultural Journal.*]

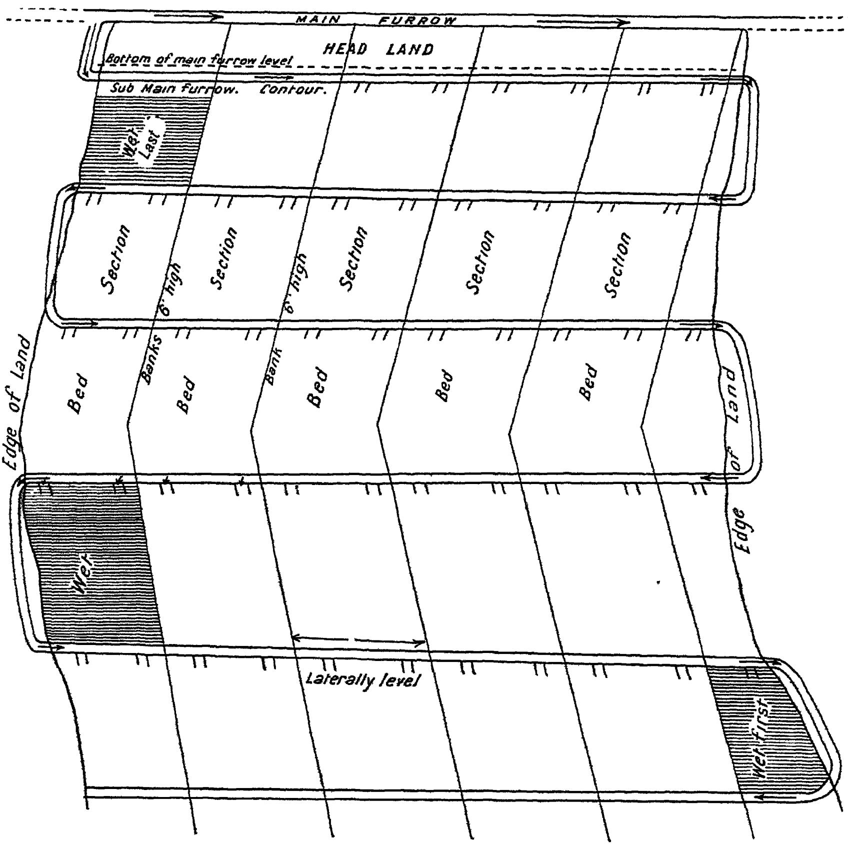
IRRIGATION, like many other subjects, sounds very well and easy on paper, and we have many splendid theoretical exponents of the art, but unfortunately quite a number of these theorists are untaught in the school of experience and are more or less helpless when it comes to the actual thing.

Conditions vary so greatly, both of soil and water supply, that no defined rules for irrigation and for laying out land for irrigation can be set down, and a man has to study his conditions, etc., then suit his methods. Along the banks of our big rivers where the alluvial deposit is of practically unlimited depth, here and there only can conditions be made to suit methods, for there the soil is of uniform quality and no disturbances of the surface can affect the crop-raising capacity of the sub-surface.

The Karroo with its fertile soil grows anything with water, but there again methods have to suit conditions, as, though there are great depths of soil in parts, other parts are shallow, and it is obvious

that levelling and terracing for irrigation must be done in such a way as to raise an even crop by not removing too much ground from any particular spot to raise some other part. The laying out should follow as far as possible the natural lie of the land.

In the undulating grassy country of the Border, with its perennial streams, extensive irrigation is not done, as the conditions do not lend themselves for the purpose. Often, however, it is possible to get fairly large pieces of mostly hillside ground under water by gravitation, and occasionally a pumping plant is created for the purpose. Though in that part water is apparently least appreciated and most carelessly




used, modern progress and the recent drought have been the means of bringing the farmers to a realization of the value of their neglected asset, and a few years will show a notable change, wherein every man will strive to make the most of his available water supply and to distribute it in a judicious manner over his land, and so retain his soil as far as possible in its place, instead of allowing it to be washed to the sea by uncontrolled streams and rotten methods of irrigation.

On such irrigable ground, the slopes being generally pretty steep and the soil shallow, it is a mistake to attempt to grow crops dependent upon an artificial supply of water to attain maturity. The establishment of some permanent pasture grass on such ground would be highly

profitable—a grass that will respond to a watering in the winter and provide green feed for dairy cattle, lambs, or for fattening hamels, and make hay in the summer. When mealies are planted on such grass they are, of course, hoed. At the critical stage rain keeps off, and water is applied; the slope is steep and washing results. This goes on year after year, until finally the land is full of dongas and unable to support any crop. This simply means that the farmer is undermining his foundation. When such land is properly established under permanent grass, watering may be done with comparative impunity, as the grass roots bind the soil, cause the water to spread out laterally over the surface and thus obviate to a great extent the vast evil of erosion.

Often the slopes on these hillsides do not fall in one direction, but several, which is a point to be reckoned with in preparing the ground for convenient irrigation. The preparation work would be as follows: After the ground has been ploughed as deeply as possible, make parallel small banks down the land, always following the slopes in order that the beds between the banks may be as even as possible, i.e. one side not higher than the other. These banks are easily and quickly made with spades after first having put a stretch of No. 14 wire down the slope as a guide, and lifting it slightly by means of plank pegs with a "V"-shaped notch out of the top. The banks need only be 6 inches high. This done, cultivate up and down between the banks, taking care not to destroy them with the implements; then sow the seed. After that, shallow contour furrows are taken out, running right through the land at intervals of from 10 to 20 yards according to the grade. The steeper the slope, the closer together the contour furrows, and vice versa. It will be seen that, to wet the land, a section at a time is done with a minimum of labour and erosion. The accompanying sketch may serve to show what is meant. The idea of the parallel banks is to confine the water within a limited space instead of having it spread all about where it becomes unmanageable. Besides, a system is given to the work, and who would dispute the value of system on a farm, or, indeed, anywhere? The sketch shows the contour furrows running across and back through the land. This is a saving of labour, but is not always practical, and the farmer must determine for himself whether the water will come from a continuous furrow, or from contours taken from each, or one side of the land.

The most successful and economical irrigators are those who prepare their land thoroughly beforehand, and those who do not properly prepare generally regret it. Perfect control of the water is the object aimed at, and this can only be obtained by careful attention to detail at the outset. When this is done the maximum volume of water can be controlled by a minimum of labour and will give the greatest return.

In the Karroo the preparation of land for irrigation is easier than in the Eastern Province, because the country is mostly flat and the soil on the whole deeper, so facilitating methods. Large volumes of flood water are handled, but, as a rule, every available hand has to be called to assist in the work—this chiefly because the land has not been properly prepared and a system of sluice gates put in, which if done would reduce the labour by 70 per cent. or more. The banks of our big rivers afford conditions absolutely ideal for the execution of every idea a man may have for irrigation, owing to the great depth

of alluvial soil; and along these, where ground has been taken up and worked, intensely large volumes of water are manipulated by an astonishingly small amount of labour because in the preparations that object was held in view. It is a simple thing for one man to control a volume of water that would fill an 18-inch pipe, and still find time to smoke. The system is so well organized that the irrigator merely has to open and close sluice gates, a spade being carried more for form than an implement to be used. It may be doubted whether the careful levelling of land (that is, to level it in such a way that the water would cover the whole surface of a bed 10 to 15 yards wide without having to use a spade) for cereal crops would pay, as after reaping the crop the ground would have to be ploughed and the level surface disturbed, and for the succeeding crop relevelled. But for permanent lucerne or grass there is no doubt that the most careful levelling will pay best in the long run. Many irrigators having a land under an annual crop to be prepared for flood water will, after ploughing, draw parallel furrows down the length of the land at intervals of 10 to 15 or 20 yards with a double-breasted plough. This plough throws up a small ridge on either bank of the furrow, and these ridges are supposed to keep the water in the bed when it is turned in at any point from the furrow. These ridges are necessarily small and at best inefficient, and instead of having a furrow at all it would be better to make a decent ridge and turn the water in at one point only, namely, the top end of the bed, and let the water flow right through. A saving of water is claimed for the furrows, but the saving, if any, is small, and the work more.

The question of the best method of watering lucerne is a much debated one. Some men hold that when lucerne is on a perfectly level bed, and water when applied will "stand," then will the heaviest yield be got. This may be rightly and wrongly argued. So much depends on the nature of the soil. On a stiff clayey soil, where water does not readily soak away, an excess of moisture will kill the lucerne, but on a porous soil tons of water will not harm it, but promote a vigorous growth, other things being equal.

Perfectly level beds are unpractical, generally speaking, as it is only where ideal conditions of soil exist that they may be made, and generally it will be found that beds with a fair amount of fall are most satisfactory. A level bed gives no end of trouble if there are moles in it; with a fall in the bed there is less risk in the way of damage through leakage from an undiscovered hole, and naturally through such a hole every drop will be drained from a level bed. Most irrigators must have had experience of the trouble moles are. Further, lucerne has a way when established of causing the water to spread out and checks to a great extent its speed, thereby inducing better soakage. The amount of fall given must vary with the nature of the soil. A loose porous soil can have more fall than a stiff, clayey soil, since it takes more water and the water travels more slowly over its surface.

The most important thing in land levelling and terracing is to know how to do it; and though one practical lesson is worth all the literature in the world, yet great assistance may be given by a simple explanation on paper.

The instruments necessary are a levelling instrument and a staff, a land leveller, reversible plough, dam scrapers and spades.

In ordinary levelling the scrapers are used for carting off the highest mounds to fill up the hollows, and then the leveller to smooth or even the surface. In terracing, after the surface of the ground has been made even with scrapers and leveller, the first thing to use is the levelling instrument to determine the direction the beds will run, and to give the approximate fall. If the ground slopes in more than one direction contour terraces must be made, being the cheapest. This done, draw parallel furrows with the plough 8 to 10 yards apart. It will be found that to make terraces much wider than that involves an enormous amount of work. Through the land, and at each end of each furrow, drive in a stout wooden peg to line the banks for subsequent finishing with spades. This being done, attach four or six good bullocks to the leveller and start to work down from the top corner of the top terrace, crossing the furrows at as nearly right angles as possible, that the banks may be kept straight. Press down the handles of the leveller causing it to "load." When half the width of the bed has been gone over relax the pressure slightly and finally empty the last ground over the first furrow. Immediately this is done over, dip again, relax after half-way, and empty on the second furrow. Repeat the process until the bottom of the last terrace is reached. Return over the same course, but this time the ground will be taken from the top half of each bed and deposited on the lower half of the bed above. On the second downward journey take a fresh strip the width of the leveller, and repeat as explained until the whole land has been done. The upper sides of the terraces may then need a second ploughing, and for this the reversible plough will be found most useful, as each bed may be ploughed separately and the ground thrown the one way. If, after the second ploughing and scraping, the beds are fairly level the banks may be built up with spades. A stretch of No. 14 wire is raised from the ground by means of pegs notched at the top. It should be at least a foot above the bed level, as the banks "set"; workers with spades then fill up the space between the wire and the ground and generally finishing the banks. The beds are then ready for another ploughing, which must be deeply done, and a final water or dry levelling. In water-levelling a stream is turned in at the highest end of a bed, and the workers keep in front of the water, seeing that it covers the whole surface evenly by distributing the ground from the highest to the lowest parts. A skilled hand is necessary to be with the workmen; and for a white man, a pair of miner's boots with rubber tops reaching to below the knees, and leather soles, are most suitable. They last for eighteen months, and if worn in wet weather save a big boot bill. Dry levelling is done with the instrument. A piece 3 feet wide and the width of the bed is made level, and other strips, 15 yards apart, down the whole length. The inter-spaces are then levelled by eye, the men becoming very skilful after a little practice. This is easier and quicker than water levelling, and often more convenient, but it remains for the owner to decide on which style he will adopt.

# Crop Rotation in connection with Tobacco and Cotton, and the Use of Fertilizers.

By EDGAR H. T. POWELL, Officer in Charge, Tzaneen Experiment Station, of the Tobacco and Cotton Division, Pretoria.

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IN writing on the subject of crop rotation in connection with tobacco and cotton and the use of fertilizers, I recognize that it is not advisable to be too dogmatic in dealing with such a question, especially in a young country like the Transvaal where such matters in the past have received little or no attention.

Sufficient data has not yet been gathered to make it possible to lay down hard and fast rules as to the rotations to be followed, but from my own experience and the best evidence obtainable it is hoped that the remarks contained in this article may be of some service to farmers, if only to help them to see the importance of some method of systematic rotation. Many difficulties present themselves in undertaking a system of crop rotation—such as the period of years necessary to successfully prove the value of any particular system, which may afterwards be upset by many unforeseen contingencies; the varying prices of the crops grown; variable weather conditions; the different diseases and insect pests to which all crops are liable; and many other reasons, all of which will be readily understood by the practical planter. So much depends also on the local conditions of each farm that perhaps no two farmers may find it advisable to deal similarly with a rotation system.

There are, however, certain general principles which may be considered as applicable to all and others made evident by experiments already carried out. The main problem in connection with the rotation of crops is to improve the soil and keep the land in as high a state of fertility as possible. Soil improvement depends chiefly on a proper system of management.

It is generally found that in the Transvaal virgin soil soon becomes in poor physical condition on account of a lack of humus or organic matter. To meet this need the use of kraal, stable, or some other kind of farm manure, and the ploughing under of leguminous crops, has proved successful.

The use of commercial fertilizers in this respect has generally proved unsatisfactory, for if it is not supplemented with humus in some form it acts only temporarily and leaves the land in worse condition than before. If it were always possible to keep land in the highest state of physical condition by such methods as here advocated the use of chemical manures would be scarcely necessary. It is as a useful aid rather than as an actual necessity that chemical manures should be used, and as such they help in the work of crop production. To the man who farms with intelligence, however, plants his crops in rotation, and grows legumes as often as possible, the use of artificial fertilizers should seldom be necessary, and consequently a great financial saving is effected.

Generally speaking, an application of lime is most useful in improving the physical condition of the soil, besides supplying a plant food element—calcium—which is said to be lacking in most of the soils of this country. It induces chemical activity and has certain decomposing effects on the mineral substances of the soil, thereby aiding greatly in the release of stored plant food. Lime and humus being the chief constituents by which plant foods are made available, the application of lime to the soil is undoubtedly most important as its functions are so far reaching.

One of the most important results following the rotation system is the eradication of plant diseases and the checking of insect pests. By the continuous growth of any one crop on any particular land the plant disease or insect pest finds each season the particular plant on which it thrives, thereby increasing in numbers yearly. By rotating crops which are completely opposite in character it will be found that these pests are kept in check. Crops in rotation should be so diverse in their habits that they will not tend to exhaust the soil by demanding similar elements of plant food, and will not carry diseases and insects from one crop to another. In this respect certain crops should not be grown contiguous to others which are affected by the same insect or disease. The mealie bug, for instance, will travel from maize to cotton and vice versa, therefore it is as well to keep these particular crops apart.

Weeds are often troublesome, which shows that the fundamental conditions of the soil are defective and something must be done to subdue and prevent them from interfering with desirable crops. In this respect a rotation of crops and some system of cultivating the soil should be adopted to prevent the weeds from taking possession of the soil. This is where an application of lime is found to be useful, as it tends to stimulate the growth of the crop, thus overpowering the weeds.

Besides the use of lime, the planting and ploughing under of leguminous crops is again suggested. The supplying of humus and nitrogen, which are so essential in maintaining the soil in a condition favourable to field crops is very important.

This eradication of weeds is another important result of crop rotation. Cultivation is of course of first importance, but it is found that the weeds that flourish during the presence of one crop are greatly lessened—if not in time completely got rid of—by a change of crops. This is due to a certain extent to the different methods of soil treatment. Grain crops allow certain weeds to grow, as there is no cultivation to check them. Tobacco and cotton shade the ground and make it difficult for certain weeds to exist. Certain weeds follow certain crops, and when these weeds become serious it is desirable to change the crop. It is very essential that weeds be kept down, as they rob the soil of the plant food that would otherwise benefit the crops.

The use of all and every kind of farm manure, the growing of leguminous crops, constant tillage, and efficient cultivation, combined with a proper rotation of crops, is the only way to improve the physical condition of the soil.

It may perhaps be observed that it is not always possible to follow strictly any one system of rotation owing to reasons already pointed out. In such a case the planter should substitute some other crop,

but always with a view of profits and improving the fertility of the soil and fitting it in general with his original rotation scheme.

The importance of bringing some kind of leguminous crop into a rotation cannot be too greatly emphasized. Besides restoring nitrogen to the soil, humus is added and the soil made more friable, and better aerated owing to the deep-root system. Humus-forming crops should be grown as often as possible on old worked-out lands.

In carrying out a system of crop rotation it is as well that the fields be laid out on some definite plan. If possible the lands should be fenced, for so many reasons hardly necessary to explain.

A system specially relative to tobacco and cotton, which has been followed with some success by this Division, having due regard to its profits and to the keeping up and probable improvement of the physical conditions of the soil, is as follows:—

> First year, cotton; second year, tobacco; third year, legumes; fourth year, maize.

Although this may be found unsuitable under certain conditions, it is given as a good basis and also gives some idea of the manner in which a rotation should be arranged.

In some instances it may be found more advisable to plant cotton before tobacco, to substitute some other crop for maize, and even to plant two crops of legumes instead of one in the rotation. These are variations which each planter must decide for himself, having due regard to the maintaining of the physical condition of the soil. Some crops seem to derive a certain benefit from being planted after certain other crops, although perhaps still tending to exhaust the soil. Cotton is apparently one of these, and seems to do well after tobacco.

Some crops extract large quantities of one fertilizing constituent, whereas others take up more of another. Tobacco, for instance, robs the soil of a large percentage of potash, but extracts less phosphates. Cotton, on the other hand, does not require the same relative amount of potash, therefore this rotation is less likely to use up one constituent more than another.

The root system of crops vary considerably. The root of the cotton plant goes deep into the soil, while those of the tobacco plant are rather shallow.

As plants get their food from those portions of the soil into which their roots penetrate, it is apparent that cotton following tobacco or vice versa removes less of the nutrients from the surface soil—or the sub-soil, as the case may be—and therefore a larger area of soil is utilized and a more economical use of plant food results. I would point out here the advisability of manuring the land, say, once during a four-years' rotation, and it is perhaps best to do so after reaping the tobacco, especially if kraal manure is to be used, for the reason that tobacco takes so much out of the soil.

It is not desirable to manure immediately preceding a tobacco crop unless artificial fertilizer is used, as this crop does better without a direct application of kraal manure. On the other hand, the more humus and organic matter—within reasonable limits—the cotton plant receives the better. Therefore the manure should be applied before planting cotton.

As no rotation is sound without containing some leguminous crop, cotton should be followed by pea-nuts, velvet beans, soybeans, or cow-peas. Either of these crops serve to restore nitrogen to the soil and

likewise add humus to it. They cannot be too often recommended as restorative crops. Generally speaking it should always be the aim to follow an exhaustive crop with a restorative crop.

The benefits derived from a leguminous crop are manifold. They increase the water-retaining capacity of the soil as well as adding to the quantity of vegetable matter present. More important still, by their peculiar root construction nitrogen is gathered from the air in the following manner. In healthy plants little nodules are formed on the roots. These nodules are caused by certain bacteria of the soil becoming parasitic in the roots. These bacteria, which live in the nodules of leguminous plants, have the power to assimilate atmospheric nitrogen. It may be mentioned that owing to the lack of bacteria these plants do not always develop nodules on the roots. Good, healthy plants, however, usually contain them, and by planting a second crop following on the first, or by transferring soil from a field where the crop has grown successfully with nodules on the roots, the land should become thoroughly inoculated.

In view of the fact that atmosphere consists of about four-fifths nitrogen, these plants have an inexhaustive source of supply of this important plant food.

The leguminous crop should be followed by maize, which usually gives good results. Maize requires a large supply of nitrogen, and does best when in rotation with legumes. It is generally believed that maize has no harmful effect on the soil, and in many ways is believed to be beneficial. The frequent cultivation this crop receives gives an effective surface mulch which helps largely to allow of rainfall entering the soil and in conserving the moisture by checking evaporation.

Cultivation aerates the soil and conserves the moisture, which stimulates decomposition, thereby maintaining a condition favourable for bacteria and chemical activity. In a rotation which includes a legume the supply of plant food and vegetable matter is maintained. Besides being a profitable farm crop, the legume undoubtedly helps more than any other crop in bringing the lands into suitable condition for the reception of the tobacco plant.

It has been found that cowpeas can be grown quite successfully by planting them in alternate rows with maize. This will give good results, as not only a crop of cowpeas is produced but the soil is improved by this method, while the maize crop, if it does not benefit it, certainly does not suffer thereby. The cowpeas should be planted at the last cultivation of the maize.

The above is an outline of a system of rotation in connection with tobacco and cotton The same general principles apply to all rotations of crops. To give profitable results and at the same time maintain or increase the fertility of the soil, a system of crop rotation must provide for the addition of vegetable matter by the use of green manures, i.e. the ploughing under of leguminous crops, by the application of farm manures or both, or by any other means available.

Regarding commercial fertilizers or so-called artificial manures. If used judiciously and with intelligence they are undoubtedly of value, but owing to their price and the high cost of transport in the Transvaal their use is to a great extent prohibitive—at any rate to those farmers situated far from the railway.

Before resorting to the use of fertilizers the planter should make

himself well acquainted with the nature of his soils, and also make a study of the physical and chemical requirements of the crops to be grown.

All plants do not require the same amount of plant food elements, and some soils are rich in one element and deficient in others. Only by making a study of these conditions is it possible to decide what artificial fertilizers would be most beneficial.

By applying fertilizers in a haphazard manner there is frequently a waste of time, energy, and money, and the crop receiving the fertilizer sustains more harm than good. For example, too much nitrogen applied may develop the stalks and leaves of a plant rather than the fruit or seed, in which case potassium or phosphorus should have been applied, as both tend to increase the grain or fruit of a plant.

Should a crop appear yellowish or sickly in appearance, nitrogen is evidently required. On the other hand, should the yield be good, in all probability the crop is not in need of potassium and phosphorus. It is for these and many other reasons that judgment should be used in applying chemical manures. A close study should be made of the needs of plants and the best method of supplying them with the necessary elements of plant food before applying artificial fertilizing.

Without this knowledge all other efforts may be futile and time and attention often wasted.

# Recent Soil Investigation in the Cape Province.

By Dr. C. F. JURITZ, M.A., F.I.C., Chief Chemist, Cape Province.

(*Continued from page* 461.)

### QUEENSTOWN.

OF the four Queenstown soils collected on the farm Harrison, No. 204 represented the surface 12 inches of a reddish grey sandy soil, and No. 205 also a reddish soil, but more clayey, represents the lower soil level from 18 to 30 inches down. On the tract from which these two soils were taken the lucerne was not thriving, in fact most of the plants were going off. No. 206 was taken from another part of the land where the surface soil was similar to that of No. 204. The sample represented the second 12 inches depth of soil, and the lucerne here was slightly better, but of slow growth. This soil was reddish-brown in colour, and contained a large proportion of clay, appearing likely to cake very considerably. No. 207, a very dark grey, almost black soil, also seemed to contain a large amount of clay and much

organic matter mixed with pebbles of lime tufa. It represented the surface soil to 12 inches depth. On this soil the plants seemed healthy and the grass very fine. Agricultural chemical analyses resulted as follows:—

| No. | Percentage of Field Sample. | Percentage of Soil sifted through 1 mm. Sieve. | | | | Percentage of Soil sifted through ½ mm. Sieve. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fine Earth below ½ mm. | Water. | Organic Matter. | Chlorine. | Nitrogen. | Lime. | Magnesia. | Potash. | Phosphoric Oxide. |
| 204 | 99·4 | ·99 | 1·66 | ·030 | ·091 | ·078 | ·071 | ·061 | ·026 |
| 205 | 84·9 | 7·70 | 5·13 | ·033 | ·095 | ·180 | ·417 | ·163 | ·033 |
| 206 | 87·7 | 8·93 | 6·59 | ·010 | ·112 | ·194 | ·307 | ·152 | ·032 |
| 207 | 98·3 | 5·48 | 6·08 | ·014 | ·129 | ·584 | ·492 | ·168 | ·097 |

The percentages of alkali salts in these soils were:—

| No. | Total Soluble Salts. |
|---|---|
| 204 | ·160 |
| 205 | ·232 |
| 206 | ·052 |
| 207 | ·080 |

Partial mechanical analyses were also made, with the following results:—

| No. | Pebbles, >3 mm. | Gravel and Coarse Sand. 3–·5 mm. | Fine Earth, <·5 mm. |
|---|---|---|---|
| 204 | ·02 | ·55 | 99·43 |
| 205 | 10·6 | 4·5 | 84·9 |
| 206 | 10·9 | 1·4 | 87·7 |
| 207 | 1·5 | ·2 | 98·3 |

In the Queenstown soils, it will be seen, No. 204 is the poorest in its reserve store of plant food, and the extremely low percentage of phosphoric oxide, not only in this soil but also in Nos. 205 and 206, seems to be the cause of their poverty. In No. 207, where the crops were in good condition, the phosphoric oxide is present in quite satisfactory amount.

## RIVERSDALE.

On the farm of Mr. De Vos, near the village of Riversdale, the samples Nos. 208 and 209 were collected. Lucerne had proved a failure on soils of this type in the vicinity, and it was supposed that this might be due to the presence of an excess of alkali salts in the soil. No. 208 was accordingly taken as representing the surface soil,

and No. 209 the sub-soil at a depth of 2 feet. Upon analysis these samples yielded the following percentages of water-soluble salts:—

| No. | Sodium Chloride. | Sodium Sulphate. | Sodium Carbonate. | Total Alkali Salts. | Magnesium Chloride. | Magnesium Sulphate. | Magnesium Carbonate. | Calcium Chloride. | Calcium Sulphate. | Calcium Carbonate. | Total Soluble Salts by analysis. | Total Soluble Salts by weighing. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 208 | ·284 | Nil | Nil | ·284 | ·178 | Nil | Nil | ·010 | ·063 | ·020 | ·500 | ·555 |
| 209 | ·106 | ·103 | Nil | ·209 | Nil | ·040 | Nil | Nil | Nil | ·043 | ·320 | ·292 |

In this soil, therefore, the soluble salts are distinctly larger in proportion at the surface than at the lower level, and the same feature was noticed that has previously been commented on by me,* namely, the tendency of the chlorides to rise to the soil surface, leaving the sulphates down below. The proportions of alkali salts at the surface are certainly excessive, more, in fact, than Hilgard considers safe for barley, and there can be little doubt that the failure ot the lucerne was due to this cause.

## ROBERTSON.

Five additional samples from the Experiment Station at Robertson were examined for brack salts, by way of supplement to those discussed on page 185 of "Agricultural Soils of Cape Colony." Nothing of material interest was elicited by these analyses in addition to the information previously published. The analytical results are given below:—

| No. | Chlorine, calculated as Sodium Chloride. | Carbon Dioxide calculated as Sodium Carbonate. | Total Soluble Salts. |
|---|---|---|---|
| | % | % | % |
| 210 | ·19 | ·47 | 1·16 |
| 211 | ·02 | ·06 | ·16 |
| 212 | ·13 | ·32 | ·75 |
| 213 | ·30 | ·75 | 1·55 |
| 214 | ·004 | ·01 | ·11 |

Nos. 215, 216, and 217 were three vineyard sub-soils which had not been manured, taken at depths of from 12 to 16 inches. No. 215 was a light-coloured soil containing many hard lumps. These lumps consist of fine material cemented together by means of carbonate of lime, and pieces of clay slate coated with the carbonate. To judge of the proportionate quantity of these lumps an ordinary mechanical analysis would be very misleading, as the proportions of fine and coarse material depend very largely on the amount of force used to break the lumps. It is probable that the hard lumps are penetrable

* "Agricultural Soils of Cape Colony," p. 187.

by the roots of plants. No. 216 is a very different type of soil. As the chemical analysis shows, lime does not dominate everything else, as in sample No. 215. The sample contained many lumps, some of which were very hard, but they were of the character of what is often known as "dorbank." In some of these lumps carbonate of lime had been deposited in the cracks. It was impossible to obtain a fair average sample of this soil without crushing all the "dorbank," the lumps of which amounted to about one-third of the entire sample. No. 217 bore a close resemblance to No. 215, and about half of the sample consisted of lumps similar in character to those in No. 215.

Partial mechanical analyses of these three soils gave the following percentages:—

| No. | Pebbles, > 3 mm. | Gravel and Coarse Sand, 3–·5 mm. | Fine Earth, < ·5 mm. | Nature of Pebbles and Gravel. |
|---|---|---|---|---|
| 215 | 16·1 | 42·1 | 41·8 | Weathered slate. |
| 216 | 18·8 | 12·2 | 69·0 | Fragments of slate and hardpan. |
| 217 | 30·3 | 26·2 | 43·5 | |

Portions of samples Nos. 215 and 217 were digested with acid in order to dissolve the carbonate of lime, and the residual material was then subjected to mechanical analysis, with the following results:

| No. | Pebbles, > 3mm. | Gravel and Coarse Sand, 3–·5 mm. | Fine Earth, < ·5 mm. |
|---|---|---|---|
| 215 | 5·9 | 8·8 | 85·3 |
| 217 | 12·4 | 14·0 | 73·6 |

Analyses as to the reserve of plant food in these soils yielded the percentages stated below:—

| No. | Percentage of Field Sample. | Percentage of Soil sifted through 1 mm. Sieve. | | | | Percentage of Soil sifted through ½ mm. Sieve. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fine Earth below ½ mm. | Water. | Organic Matter. | Chlorine. | Nitrogen. | Lime. | Magnesia. | Potash. | Phosphoric Oxide. |
| 215 | 41·8 | 4·61 | — | ·040 | ·136 | 18·64 | ·542 | ·063 | ·277 |
| 216 | 69·0 | 2·22 | — | ·040 | ·154 | ·384 | ·232 | ·077 | ·088 |
| 217 | 43·5 | 3·86 | — | ·035 | ·084 | 5·650 | ·565 | ·074 | ·090 |

The proportions of nitrogen in these soils are fair, and No. 215 shows a very satisfactory proportion of phosphoric oxide, of which Nos. 216 and 217 contain a fair amount. The potash percentages are fair throughout. As to lime, No. 215 has a very large proportion; No. 217 is also rich in lime, and No. 216, although it cannot strictly be called a "lime soil," has nevertheless a satisfactory lime content.

## STELLENBOSCH.

Sample No. 218 was collected on Sir James Sivewright's farm, Lourensford, Somerset West. It was a mixed sample, taken from various parts of the orange orchards to a depth of about two feet. The soil of these orchards appears to be uniform throughout. They lie in a valley on the banks of the Lourens River. From the depth of the "sloots" made by flood water the soil seems to be at least 6 to 7 feet deep. The orange trees are planted about 15 feet apart each way, and the orchards are surrounded by large oaks, gums, poplar and other trees. On many of the orange trees the leaves were yellow or turning yellow and falling off, nor had the orange crops been good for the last two seasons. The orchards are well drained, and can be irrigated at any time the occupant pleases. Sample No. 219 was collected on the farm Zeekoevlei, near Eerste River. The analyses of these soils resulted as follows:—

| No. | Percentage of Field Sample. | Percentage of Soil sifted through 1 mm. Sieve. | | | | Percentage of Soil sifted through ½ mm. Sieve. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fine Earth below ½ mm. | Water. | Organic Matter. | Chlorine. | Nitrogen. | Lime. | Magnesia. | Potash. | Phosphoric Oxide. |
| 218 | — | 4·51 | 12·29 | ·121 | ·252 | ·036 | — | ·042 | ·139 |
| 219 | 100 | 9·07 | 10·65 | ·318 | ·112 | ·180 | ·171 | ·122 | ·010 |

In No. 218 analysis indicated deficiency in both lime and potash, the proportion of phosphoric oxide being good. The use of gypsum with sulphate of potash and nitrate of soda for fertilizing purposes was suggested. It will be noted that in the orange orchards of the Albany Division, where chlorosis also occurred, lime and potash were also lacking in the soil. In No. 219 the amounts of lime and potash may be considered fair, but this soil was exceedingly defective as far as phosphates were concerned.

## UITENHAGE.

No. 220, a dark, sandy soil lying above pot clay, was taken from "gebroken" sour veld in the rather hilly coast country where oats are principally grown. The sample was collected on the farm Mount Vista, from the top of a rise which had been in constant use for forty

years, and had never received manure. The intention was to grow mealies on the land in question. Agricultural chemical analysis gave the following results:—

| No. | Percentage of Field Sample. | Percentage of Soil sifted through 1 mm. Sieve. | | | | Percentage of Soil sifted through ½ mm. Sieve. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fine Earth below ½ mm. | Water. | Organic Matter. | Chlorine. | Nitrogen. | Lime. | Magnesia. | Potash. | Phosphoric Oxide. |
| 220 | 99·7 | ·69 | 1·61 | ·007 | ·070 | ·026 | — | ·028 | ·019 |

These analytical results are very poor, and the need of all-round manuring is thereby indicated. The Government Agriculturist has therefore advised a dressing of one of the following alternatives per acre:—

| 1st Alternative. | 2nd Alternative. |
|---|---|
| 100 lb. Government guano. | 100 lb. Nitrate of soda. |
| 200 lb. Superphosphate. | 275 lb. Superphosphate. |
| 30 lb. Sulphate of potash. | 35 lb. Sulphate of potash. |

These methods of fertilizing the land (which covered 13 acres) were thereupon adopted, and the mealies sown with a mealie sower) resulted in a splendid crop of good, strong uniformly-sized seedlings. A large and in every way remarkably fine yield was expected from these, but, unfortunately, cutworm made its appearance and proved disastrous to the young crop.

Twelve samples of virgin soil were collected from farms on the Selborne Estate at Addo. Three farms were selected for this purpose, and on each of these four samples of soil were taken, representing, respectively, the first, second, third, and fourth 12 inches of soil, that is to say, down to a depth of 4 feet in all. The first of the three farms visited was Mr. Hume's farm Belmont, and Nos. 221, 222, 223, and 224 were taken in the manner described from a point near the road due south of the homestead between Mr. Hume's and Mr. Meyer's lots. From Mr. I. J. Ferreira's farm, Headlands, near the Sundays River, at a spot south-west of the homestead, Nos. 225, 226, 227, and 228 were similarly taken. Then Nos. 229, 230, 231, and 232 were collected on an unsold plot between the farms Sunnyside and Walston at a point near the road running at right angles to the Sundays River, where the island divides the river into two streams. In these sixteen soils the following determinations of water-soluble salts were made, the results being given, as usual in such cases, in percentages of the soil as sifted through a 3 mm. sieve:—

| No. | Sodium Chloride. | Carbon Dioxide. | Total Water-soluble Salts. |
|---|---|---|---|
| 221 | ·017 | ·015 | ·080 |
| 222 | ·012 | — | ·042 |
| 223 | ·017 | ·028 | ·068 |
| 224 | ·012 | ·029 | ·096 |
| 225 | ·017 | — | ·040 |
| 226 | ·024 | ·020 | ·064 |
| 227 | ·024 | ·020 | ·080 |
| 228 | ·017 | — | ·026 |
| 229 | ·017 | ·015 | ·044 |
| 230 | ·024 | ·014 | ·088 |
| 231 | ·012 | — | ·026 |
| 232 | ·012 | — | ·028 |

From these analytical figures it is obvious that there is no indication of brack in the soils at any of the localities visited. The flood water with which the Sundays River soils were to be irrigated in summer is fairly fresh, but the winter supply shows rather high amounts of alkali salts, and may render the lands brack unless precaution be exercised to keep the land well drained, coupled with judicious surface tillage. It is possible that the analysis, given below, of the winter supply water represents it at its worst, and that considerable improvement occurs at other seasons; this, however, cannot be settled without further investigation. The composition of the river water during the winter season was found to be as follows, calculated in grains per gallon:—

| | |
|---|---|
| Total dissolved solids ... ... ... ... | 186·8 |
| Silica ... ... ... ... ... ... | ·62 |
| Alumina and oxide of iron ... ... ... | ·26 |
| Lime ... ... ... ... ... ... | 7·46 |
| Magnesia ... ... ... ... ... ... | 17·00 |
| Alkalies, calculated as $Na_2O$ ... ... ... | 59·84 |
| Chlorine ... ... ... ... ... ... | 74·19 |
| Sulphuric oxide ... ... ... ... ... | 26·44 |
| Carbon dioxide ... ... ... ... ... | 7·39 |

*(To be continued.)*

# Root-knot, Gallworms, and Eelworms.

A short account arranged by CLAUDE FULLER, Division of Entomology.

(*Continued from page* 448.)

### BEET SICKNESS.

ANOTHER eelworm is responsible for a European trouble known as "beet sickness of the soil." So far the eelworms discussed affect only the aerial portions of the plant. In this instance the pest is a root-inhabiting form—which, whilst destroying the roots, does not cause those malformations which are a conspicuous characteristic of the attack of our most common eelworm discussed subsequently under the heading Root-Knot, etc.

This beet disease makes its first appearance as light coloured patches found here and there among the normally developed beets. The leaves are weak and limp, and the outer ones especially get yellow, spotted, and die off. Later on the inner leaves die as well, after which the top of the beet becomes black and the whole root gradually decays.

The life history of the beet nematode is as follows: The female is found fixed to the branches of the root; it is citron-shaped, about one twenty-fifth of an inch long, and contains on an average three hundred and fifty eggs. Some few of these, together with a jelly-like substance making up an "egg-sac," may pass out to the exterior, but the large majority develop in the body of the female, which ultimately becomes a mere sac enclosing the eel-like larvae. The female is killed by the process. The liberated larva seeks out a root (about one twenty-fifth of inch thick), and bores into it. Here it lives as a parasite, causing the disease of the attacked beet plant. The larva quickly sheds its old skin, assumes a thicker form, ceases to move, and gradually causes the outer skin of the root to bulge out externally. The distinction between the sexes now rapidly makes its appearance. A thick motionless larva, destined to become a male, temporarily ceases to feed, shrinks within its old skin, develops a thin new one, and ultimately becomes a long eel-like worm, which grows into an adult male. The mature male bores out of its larval skin and out of the root, passing into the soil, where it finds and fertilizes the female, which in the meantime has developed but remains attached to the root. The female develops in a simpler way, by the gradual distension and growth of a larva (not by a process of re-formation) and gradual development of the female sexual organs. As the larva develops into the adult condition, the outer skin of the rootlet is ruptured, and the female comes out from its tissues, remaining, however, attached to its outside. The entire development from egg to sexual adult takes four to five weeks, and there may be six or seven successive generations, the reproduction is consequently very rapid.

It also obviously follows that "beet sickness" of the soil is especially prevalent in fields where there has been an excessive amount of beet culture. The disease, however, may suddenly appear in fields which have been hitherto "safe" for beet, and in many

such cases it has been proved to result from manuring with artificial compost rich in refuse from affected fields. The disease frequently appears, too, in fields where beet has never been cultivated, but where cabbage has been grown for a long time. It has been shown, especially by Kuhn's investigations, that the beet eelworm can live in many plants both cultivated and wild, e.g. of the former, cabbage, rape, mustard, garden cress, chickling peas, mangold, oats; of the latter, charlock, spurrey, couch grass. These researches are of the greatest importance both for understanding the way in which beet sickness spreads and in combating it.

*Preventive Measures.*—Manufactured compost must not be used as a manure on beet fields. The refuse from infested beets, if used on other fields, must be mixed with one-sixth its bulk of quicklime. The boots of labourers employed in beet-sick fields, the hoofs of horses working in them, and also the implements used, must be carefully cleansed lest infected earth should be carried to other fields.

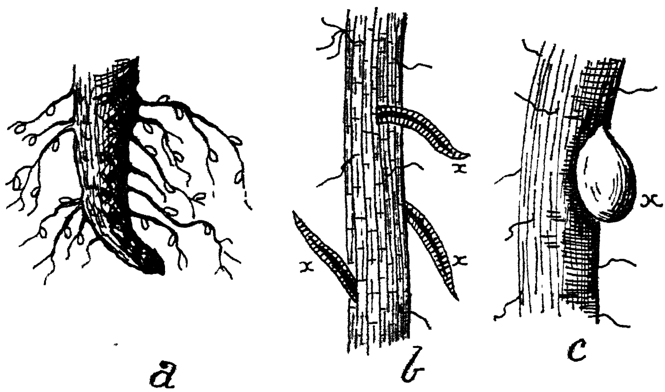



Fig. 4.—The Beet Eelworm.

*a.* A beet-root with adult female worms attached to rootlets (natural size). *b.* A rootlet of beet with eelworms (*x x x*) entering it. *c.* A rootlet of beet with adult female attached. (*b* and *c* greatly magnified.)

*Remedies.*—Kuhn has recommended the use of plants which attract the eelworm ("lure-plants"). He sows on beet-sick land rapidly germinating plants of kinds which the worms readily attack, and weeds them out again when they have become infested by the parasites, but before these have had time to mature and re-enter the soil. The eelworms are thus allured into the plants grown, and destroyed with them. Such lure-plants must be sown as thickly as practicable, so that the soil may be penetrated by as many slender rootlets as possible. After these plants have been dug up, a second lot should be grown, since all the eelworms will not have attacked the first lot; and it is even advisable to grow a third batch. Kuhn used as lure-plants the various kinds of cabbage, also summer rape (*Brassica rapa*), since this plant has a great attractive power for the beet eelworms, and can hold a large number of them in its numerous, much branched rootlets.

## ROOT-KNOT DISEASE AND GALLWORMS.

Root-knot disease arises from the attack of an eelworm which confines itself to roots and tubers of plants and causes very pronounced


*Plate No. LXVI.*

ROOT-KNOT OF TOBACCO, CAUSED BY GALLWORMS.

swellings which are readily recognized as knots or galls. In its most familiar form the disease is known throughout South Africa as potato gallworm.

Its development is much like that of the beet eelworm, except that it lives more deeply within the tissues and causes pronounced malformations on practically all the plants which it affects. These excrescences on decaying liberate the eggs and young worms into the


Fig. 5.—Root-knot of Peach, caused by Gallworms.

soil, and the effect of the parasite upon the plant is deepened by the free entrance of germs and fungi which complete the destruction of the root system.

It is reasonably supposed that this pest is distributed more generally with seed potatoes in South Africa than by other means, but the factors which spread other eelworms play an equally important rôle in its dissemination throughout farm and garden lands.

As a pest it is locally conspicuous among solanaceous crops, such as tobacco, tomatoes, Cape gooseberries, and, of course, potatoes, and

upon the coast lands of Natal the growth of the lady-finger banana is impossible in infected soils. The following is a résumé, prepared from an extensive report upon the most recent investigation of this pest.

*Symptoms of Root-knot.*—The presence of root-knot becomes noticeable when the affected plants become dwarfed or begin to die, but it is often present and causing a great reduction in the crop yield without the grower's knowledge. Indeed, it is probable that greater actual loss occurs from the form of the disease where, to the untrained eye, no signs are visible than in the case where the plants are actually killed. A farmer soon learns by experience not to plant in infected fields those crops liable to total destruction, while he fails to notice a reduction in yield, especially if the disease be well established and not a recent introduction, so long as the affected plants do not show too great dwarfing or discoloration.

Aside from the killing or dwarfing of the plants in severe cases or the reduction of yield in less serious infections there are no very noticeable symptoms apparent on those parts of the plant above ground. If rainfall has been rather scanty during the summer, the affected plants first show the lack of sufficient water, while sometimes the wilting is apparent when the sun is hot, even with abundant soil moisture. Occasionally no discoloration is noticeable, but usually plants that are badly affected show a lighter shade of green than unaffected plants. Since, however, the disease usually occupies large areas when it has been long established, there would be no opportunity ordinarily to compare affected with unaffected plants in mass, so that this difference would be readily overlooked.

On the roots, on the contrary, very marked structural changes are apparent. Instead of being smooth and of uniform or slowly decreasing diameter toward the tip, they show irregular enlargements which involve the whole root if it be small or sometimes only one side of a large root. These are not superficial swellings only slightly attached to the root, as in the case of the bacterial tubercles of leguminous plants, but are integral parts of the root itself. On small roots these swellings may vary from only slightly greater than the thickness of the root to twice as thick, and spherical to spindle shaped; on larger roots they are usually lateral, or in bad cases may involve all sides, making a gall many times the normal diameter of the root and covered with furrows and seams until the root loses all semblance of its normal appearance.

*Plants affected by Root-Knot.*—The nematode or eelworm causing root-knot seems to be one of the most omnivorous known. The plants recorded as more or less subject to its attack number almost 480 species and varieties, and most of the important field and garden crops, together with ornamentals, fall into this category. Among our common or well-known plants that have been found infested, the following may be cited:—

1. *Fruits.*

(*a*) *Severely Injured.*—Cherry, peach, pomegranate, fig, grape, lady-finger banana, persimmon, roselle (sorrel), Cape gooseberry, granadilla.

(*b*) *Abundantly Infested, apparent injury not great.*—Pineapple, quince, walnut, mulberry, guava.

2. *Field Crops.*

(*a*) *Severely Injured.*—Potatoes, tobacco, beet, mangel wurzel, rape, soya-bean, flax, cowpea, crimson, red, and white clover.

(*b*) *Abundantly Infested, apparent injury not great.*—Jute, Sea Island and upland cotton, sweet potato, lucerne, vetches, sugar-cane.

3. *Vegetables.*

(*a*) *Severely Injured.*—Tomato, celery, chillie, watermelon, musk-melon, cucumber, squash, pumpkin, carrot, lettuce, gourd, egg-plant, sponge-gourd, bean, parsnip.

(*b*) *Abundantly Infested, apparent injury not great.*—Shallot, onion, asparagus, cauliflower, cabbage, kale, Jerusalem artichoke, lima bean, garden pea, horse radish, spinach.

4. *Garden Plants.*

(*a*) *Severely Injured.*—Hollyhock, cornflower, snapdragon, clematis, Cape jasmine, carnation, morning glory, sweet pea, nicotiana, petunia, tuberose, violet.

(*b*) *Abundantly Infested, apparent injury not great.*—Daisy, chrysanthemum, pink, gladiolus, hibiscus, Christthorn, geranium, portulaca, mignonette, rose, spiraea.

5. *Miscellaneous.*

Coffee, pecan, Persian walnut, European elm, acacia, dead nettle, sorrel, dock, tansy, nightshade, and many other weeds.

*Plants not Affected by Root-Knot.*—It cannot be said satisfactorily that any plants are immune to the attack of this eelworm. Among the better known the following were grown in infected ground without becoming infected to the slightest degree, and this is the only guide there can be to immunity, although in all such experiments it is to be recognized that conditions may have been adverse to the gallworms and that under other conditions the particular plants might have been infested:—

1. The velvet bean and several species of the genus to which it belongs.
2. Many grasses, such as crab grass, red top, and Johnson grass.
3. Some varieties of oats (some are susceptible).
4. Some varieties of barley.
5. Japanese barnyard millet, broomcorn millet, pearl millet.
6. Timothy, rye, sorghum (imphe), amabele (kaffir corn), wheat, maize.

*Life History.*—The life-cycle of this nematode, from egg to egg, may take place in four weeks, or longer, depending upon the temperature of the soil. The larval stage is that in which entry into the host takes place. It then becomes motionless and soon enlarges and undergoes a sort of metamorphosis, the males eventually recovering the original worm shape, while the females become pear or flask shaped and very much enlarged in their transverse dimensions. Each female lays 500 or more eggs. The winter is passed probably most frequently in the larval stage in the soil, but in the case of galls on perennial roots the nematodes may over-winter in these in a more advanced stage, even as practically mature and perhaps already fertilized females.

For the rapid multiplication of the root-knot nematode, the following conditions are necessary: (*a*) A certain degree of warmth of


*Plate No. LXVII.*

ROOT-KNOT OF PUMPKIN, CAUSED BY GALLWORMS.

the soil. Thus, in southern Florida, this nematode is active the year round; in part of South Carolina the active season is from 20th April or 1st May to the middle or end of October, while farther north the period is still shorter. (*b*) Loose-textured soil. Only sandy or at least light soil is favourable to its spread. (*c*) Moisture. The drying out of the soil is frequently fatal to the nematode and in any case prevents it from doing any harm. Apparently the moister the soil, as long as it is well supplied with air, the more favourable it is to the nematode's development. However, wet soil, i.e., soil in which the air spaces are filled with water, is at length fatal to the nematode. (*d*) Food supply. The larvae are able to exist in the soil for more than one year, but apparently not for two years, without the presence of living plants into which to enter. They are apparently unable to develop beyond the larval stage unless they enter a suitable host plant.

*Distribution.*—The nematode is distributed in several ways: (*a*) The larvae move through the soil by their own motion, but the distance traversed thus is probably not more than six feet or so a season. (*b*) They are carried from field to field in the earth, clinging to implements, the hoofs of animals, the boots of labourers, wagon wheels, etc. (*c*) They are conveyed by irrigation and in the soil that is washed from one field to another by heavy rains, a very common mode of distribution of this pest. (*d*) It is possible that heavy winds may carry larvae or eggs with the soil blown from one field to another, but probably most would be so dried out in the process that this is not much to be feared. (*e*) They are introduced into new places in the roots or in the dirt adhering to the roots of nursery stock, in rooted cuttings, potted plants etc., especially those of the peach, grape, fig, mulberry, potato, ginseng, etc.; also in the dirt in which some weeds are packed. (*f*) They are sometimes brought to a field in manure if the manure pile has stood on infested soil.

*Remedies, Control, etc.*—The following methods of control in greenhouses and seed beds may be used: (*a*) The most efficient method is the use of live steam at fairly high pressure. The steam is forced through a system of perforated pipes laid at the bottom of bed or bench. (*b*) The old infested soil may be entirely removed and the benches thoroughly cleaned out. Then non-infected soil may be put in its place. This method is not advisable in regions where the nematode occurs out of doors in the vicinity. (*c*) Infected soil, when it is desired to save it and steaming is impracticable, may be freed by allowing it to lie through the winter in a place where it will be exposed to alternate freezing and thawing, and especially to drying. (*d*) Soil containing perennial plants can be nearly if not quite freed from nematodes by the use of an abundance of a solution of formaldehyde (1 part of commercial formaldehyde to 100 parts of water). This solution is fatal to many plants and can be used only with great caution.

For the control of the nematode in the field where the land is occupied by perennial crops no entirely satisfactory chemical application can be recommended. Places where trees are to be re-set should be freed from nematodes by the use of carbon bisulphide at the rate of 3 or 4 ounces per square yard placed in about nine holes per square yard, these holes being about 6 to 12 inches deep, and to be filled with dirt as soon as the chemical is placed in them. Carbon bisulphide cannot be used with safety round living trees. Flooding the land seems to be unsatisfactory, as flooding long enough to kill the


*Plate No LXVIII.*

ROOT-KNOT OF CARROT, CAUSED BY GALLWORMS.

nematodes is usually fatal to the trees. High fertilization and constant cultivation to induce growth often so help the trees that they are able, as it seems, to outgrow the trouble, the roots either penetrating to levels where the nematodes are less abundant or being formed faster than the galls can be produced. Avoid growing susceptible cover crops like the ordinary non-resistant varieties of cowpeas, for example, for these multiply the nematodes in the soil manyfold. In preparing the lands for setting out a perennial crop the soil should be freed from nematodes by the use of the methods suggested below.

Fig. 6.—Section of Banana Root (enlarged), showing Female Gallworms, inflated with eggs and embedded in the tissue of the root.

For land infested with nematodes and not bearing a perennial crop, the following methods may be recommended: (*a*) Keeping the land free from vegetation of all kinds for two years. This is the most effective method, but it is not practicable in many cases; (*b*) planting the land to non-susceptible crops for at least two (perhaps better three) years, using in the winter small grains, such as wheat, rye, or oats, and in the summer the velvet bean, Florida beggarweed, the iron cowpea, or even peanuts, scrupulously destroying all weeds that might harbour the nematodes; (*c*) making heavy applications of fertilizers, especially those containing potash, except where the soil already contains this in abundance—this treatment often reduces nematode injury greatly; (*d*) flooding the land for a period of some weeks; (*e*) where rain is not likely to interfere with ploughing, and allowing the soil to dry out for several months; (*f*) preventing, by the use of embankments, ditches, etc., the washing of soil from infested fields to the

field which it is desired to free from the pest. The introduction of the pest by tools, wagons, farm animals, etc., should be avoided. The trap-crop methods and the use of various chemicals have not proved practicable according to some writers. The former needs, perhaps, further trial.

*Conclusion.*

The ideal procedure is to develop non-susceptible strains of plants, so that the expense and trouble of combating the pest may be avoided. Such strains may be obtained by the selection of more resistant plants or by crossing with resistant strains, followed by the careful selection and breeding of the progeny. In this connection it is to be mentioned that the iron variety of cowpea has been found immune, whilst most other sorts are exceedingly susceptible. Also a strain of tobacco has been found resistant, and certain figs (Celeste and Poulette) are said to be less subject than other kinds. Varieties of grape vines vary greatly in their susceptibility, while some of phylloxera resistant hybrids and some pure American sorts, on the other hand, are practically immune.

Experiments have shown that it would be quite feasible to breed a watermelon that would be practically immune. Simple selection can be and ought to be practised by every one who grows his own seed: more complicated breeding work, unless performed by men who can devote considerable time to it, hardly pays for the time and expense required.

In carrying out simple selection we must remember that no new characters are originated by this method. We simply select and strive to fix in one strain certain characters that are present as variations in the plants we are working with. Thus, if we find in a field badly infested with nematodes that a certain proportion of the plants are free from root-knots, while the rest succumb, it would probably pay to begin selecting seed from the unaffected plants. It is better still if we can inbreed or intercross similar resistant plants. On the other hand, resistance to nematodes seems sometimes not to be one of the variations occurring in a plant. Such a plant cannot be selected, as there is no foundation on which to build. However, by crossing it with some nearly related non-susceptible sorts, some of the progeny may possibly show desirable qualities of resistance, while, at the same time, preserving the best qualities of the parent sorts.

In all such breeding it must be borne in mind as a very important principle that this work should be done in badly infested fields. If naturally infested fields are not available, provision should be made to do this work where the disease is abundant.

Every farmer ought to be able at least to carry on this simple selection: When any plants in an infested field show special vigour and freedom from root-knot they should be marked and the seed collected before the main crop is gathered. This should only be done, however, if these resistant plants are also up to standard in all other features.

# The Problem of the Witchweed.

By H. H. W. PEARSON.

UNDER the above title a report on the investigation of the life history of the witchweed (*Strigalutea*) has been published as a separate bulletin. The following is a summary of its contents.

The witchweed is probably a true native of South Africa. It occurs quite commonly in uncultivated land as a parasite upon various native grasses in Zululand and Natal, and, occasionally, in the Transvaal. It is, however, probable that originally it was confined to the south-eastern coast belt and has spread inland with the extension of maize cultivation. It occurs also abundantly in tropical Africa, Egypt, Madagascar, Arabia, Ceylon, Bengal, Punjab, Sind, Deccan, Siam, Java, and China. Outside Africa it apparently does not inflict serious injury upon any field crop, though in India it is of common occurrence in the rice-fields.

Like a number of other root-parasites belonging to the same family, the witchweed, although in cultivation an annual, spends the first few weeks of its life underground as a complete parasite. It is during this period that the greatest harm is inflicted upon the maize. Later in the year its shoot appears above the soil, flowers and sets seed.

While the witchweed is known mainly as a parasite upon the maize, it nevertheless shows a tendency, which is perhaps increasing, to establish itself upon other crops. It occurs with frequency on the kaffir corn; at Potchefstroom it is parasitic on paspalum; in Natal it is found on sugar-cane, and on the Springbok Flats it does occasionally succeed in establishing itself upon the monkey-nut.

The seed has been successfully germinated in the laboratory, and although the conditions controlling germination are not yet completely known, some important facts have been established. Successful germination probably never occurs except in the vicinity of a suitable host-plant. This fact greatly increases the difficulty of dealing with the pest, for the ordinary method of following is thus of no service in clearing the soil of the means of infection. It appears that the seed is very long-lived, and in the absence of a suitable host may remain alive in the soil for several years. Germination in the presence of the host-plant is considerably affected by the physical characters of the soil; it occurs much less freely in a soil capable of retaining water than in one which is quickly dried out. The seeds in general germinate more readily in a dry soil than in the presence of free water. Fresh seed will not, as a rule, germinate at all; it becomes mature, i.e. capable of germinating, only after a period of rest in the soil. This period is variable and may be as short as a few weeks.

The young root on emerging from the seed grows, as a rule, directly towards the nearest root, the herb; having reached it, the witchweed root quickly penetrates the root of the herb plant. From this time onwards the host and the parasite are inseparably united, and it is usually impossible to destroy the one without at least injuring the other also. The time occupied by the witchweed seedling in

reaching the surface of the soil appears to depend in some degree upon the age of the maize plant attacked. If the latter is a young seedling the witchweed remains long below ground; during this time it sends out numerous roots which make fresh infections wherever they come in contact with maize roots. If on the other hand the maize-plant is near maturity when it is attacked, the growth of the witchweed is more rapid. In the former case the attack of the witchweed is frequently so vigorous that it defeats its own ends by killing the host before it (the parasite) has had time to complete its own life-cycle by setting seed.

It follows from these facts that when the witchweed seed has once reached the soil, infection can only be prevented by killing either the seed before germination or the seedling before infection. It is probable that the former is impossible, except by the use of methods which would render the soil unfit for use for a longer or shorter period after their application. The discovery of methods of killing the young seedling without injuring the soil or the maize has been the object of prolonged investigation.

As a result of numerous laboratory experiments it was found that the witchweed seeds

(1) germinated much more readily in an acid than in a neutral medium—a result which perhaps gives some clue to the explanation of the effect of the presence of a mealie root in causing germination to occur;
(2) do not germinate readily in the presence of a free alkali (such as ammonia);
(3) do not germinate readily in the presence of certain easily soluble salts (such as common salt and sodium nitrate).

These results were made the basis of field experiments which are described in detail in the full paper. The laboratory experiments indicated that the use of free alkalies and of sodium chloride and sodium nitrate would probably give a measure of success in retarding the germination of the witchweed seed and therefore in lessening the infection of the crop. But they yielded no information as to the proper quantities of these substances demanded by the object in view. This could only be determined by the field experiments themselves. In the first instance it was decided to use quantities which could not be harmful, and in some cases at least might be expected to be beneficial to the maize crop. The following results were obtained:—

1. An application of 150 lb. per acre of common salt, followed by 100 lb. per acre of sodium nitrate.—A slight reduction of infection.

2. An application of 100 lb. per acre of sodium nitrate, followed by 150 lb. per acre of common salt.—Infection slightly reduced.

3. Application of 150 lb. per acre of common salt.—No definite result.

4. Application of 150 lb. per acre of common salt, followed by a second application of the same amount.—No definite result.

5. Application of 150 lb. per acre of sodium nitrate.—Maize better grown; infection by witchweed less than in the controls.

6. Same as No. 5, followed by a second application of the same amount.—The same results as in No. 5, but more pronounced.

7. Application of 150 lb. per acre of lime nitrogen (a substance yielding free ammonia).—No definite result.

8. Application of 150 lb. per acre of lime nitrogen, followed by a second application of the same amount.—No definite result.

9. Application of 300 lb. per acre of common salt.—No definite result.

10. Application of 300 lb. per acre of common salt, followed by 150 lb. per acre of lime nitrogen.—No definite result.

The results thus obtained in Nos. 5 and 6 suggest that larger quantities of sodium nitrate would be likely to be more effective.

Common salt in the quantities used was unsuccessful. Mr. C. H. Mitchell, of Bushy Vales, Natal, one of the gentlemen to whom I am indebted for assistance in carrying out these field experiments, applied a much heavier dressing of common salt to land known to be badly infected with witchweed. He states that "over the land where the salt was spread broadcast there has been no sign of the witchweed, though in the grass lands near it has shown very freely." This probably indicates that the quantities used in experiments Nos. 3, 4, and 9 were too small to be effective.

There is at present no indication as to the reason for the apparently complete failure of the lime nitrogen.

The correct interpretation of this series of field experiments must remain uncertain until the results of further experiments on the lines indicated in the coming season are known. In the meantime it should be pointed out that the problem is becoming more serious year by year. Until reliable remedial measures have been found farmers who are unable to command labour sufficient to prevent the witchweed seeding by the ordinary methods of cultivation are urged not to plant maize on land known to be badly infected. Kaffir corn usually supports so little witchweed that it can be kept down with very little expense, and crops not belonging to the grass family are in general quite free from infection. A badly infected maize crop left to itself until the witchweed seeds may be sufficient to spread the pest over many square miles of ground.

# The Chemical Composition of South African Maize and other Cereals.

By Dr. C. F. JURITZ, Chief Chemist, Cape Province.

(*Continued from page* 501.)

## PHOSPHO-CONSTITUENTS OF MAIZE.

IT is interesting to note, in connection with the analyses of South African grown maize, that, of the eight samples giving highest results for phosphoric oxide, five were ground maize (mealie meal). In three cases out of those five, samples of the whole grain had also been submitted for analysis, and it may therefore be useful to tabulate the average results of the three analyses of whole maize, and to compare them with the results obtained from the same maize after milling; this is done below:—

| | Water. | Proteins N × 6·25. | Fat. | Digestible Carbo-hydrates. | Fibre. | Ash. | Phosphoric Oxide. | Fuel Value: Calories per pound. | Nutrient ratio. |
|---|---|---|---|---|---|---|---|---|---|
| Whole maize (Nos. 2, 4, and 6) | 12·07 | 9·42 | 5·61 | 70·21 | 1·53 | 1·17 | ·534 | 1676 | 8·9 |
| Mealie meal (Nos. 3, 5, and 7) | 11·09 | 9·49 | 6·19 | 70·55 | 1·38 | 1·30 | ·763 | 1704 | 9·0 |

Hence, in the samples, as received in the laboratory, the phosphoric oxide averaged practically 50 per cent. more in the meal than in the whole grain, and if allowances be made for the water present in the samples the average percentages of proteins and phosphoric oxide in the absolutely dried samples are as follows:—

| | Proteins. | Fat. | Phosphoric Oxide. |
|---|---|---|---|
| In the whole maize ... ... ... | 10·71 | 6·38 | ·607 |
| In the mealie meal ... ... ... | 10·67 | 6·97 | ·858 |

which means that while the proteins are scarcely diminished by milling, the fat and phosphates are actually increased apparently by the rejection of those parts of the grain which are poor in oil and in phosphorus.

Mr. Horsfall claims on behalf of his milling process that, to a large extent, it retains the nutritive elements which the roller process eliminates from the meal. All the samples of meal procured from him

were "milled whole maize," that is, the whole grains of maize were milled but not sifted, and so the meal contained all the bran and germ.

The whole subject of the phosphatic content of maize is of so interesting a nature that we may well devote a short space to considering the relation of the phosphoric oxide in maize, not to the whole grain, nor yet to the dry substance of the maize, but to the ash constituents, that is, to the total inorganic or mineral matter in the maize. If we, therefore, inquire how much, of all the mineral matter contained in the maize, is made up of phosphoric oxide, we find the following:—

| Number of Sample. | Phosphoric Oxide: per cent. in ash. | Number of Sample. | Phosphoric Oxide: per cent. in ash. | Number of Sample. | Phosphoric Oxide: per cent. in ash. | Number of Sample. | Phosphoric Oxide: per cent. in ash. |
|---|---|---|---|---|---|---|---|
| 2 | 48·82 | 15 | 45·90 | 28 | 38·97 | 41 | 45·61 |
| 3 | 73·87 | 16 | 42·31 | 29 | 36·27 | 42 | 43·27 |
| 4 | 52·00 | 17 | 37·23 | 30 | 43·60 | 43 | 48·59 |
| 5 | 75·22 | 18 | 59·63 | 31 | 52·79 | 44 | 44·37 |
| 6 | 37·85 | 19 | 39·49 | 32 | 55·56 | 45 | 47·62 |
| 7 | 37·01 | 20 | 38·79 | 33 | 46·79 | 46 | 48·33 |
| 8 | 45·79 | 21 | 39·40 | 34 | 43·52 | 47 | 51·64 |
| 9 | 46·12 | 22 | 39·30 | 35 | 41·49 | 48 | 46·34 |
| 10 | 41·28 | 23 | 34·12 | 36 | 40·00 | 49 | 48·06 |
| 11 | 40·08 | 24 | 36·96 | 37 | 48·06 | 50 | 50·41 |
| 12 | 43·29 | 25 | 37·12 | 38 | 42·73 | 51 | 42·86 |
| 13 | 44·67 | 26 | 42·41 | 39 | 50·00 | | |
| 14 | 41·68 | 27 | 37·32 | 40 | 44·07 | | |

There are several points worth attention in the above table. Nos. 3, 5, 7, 8, 31, and 32 represent the ash of milled grain. These (Nos. 7 and 8 excepted) contain by far the highest percentages of phosphoric oxide in the whole series of analyses, the average of the four samples (Nos. 3, 5, 31, and 32) being 64.36 per cent. In this connection it will be noted with respect to Nos. 2 and 4 how greatly the phosphoric oxide content of the ash is increased by milling.

It will also be seen that the proportion of phosphoric oxide in the ash of the two Chester County Mammoth samples (Nos. 35 and 40) is not particularly low. Their defect is rather that there is an all-round deficiency of mineral constituents, phosphoric oxide amongst others.

On the other hand, of the unmilled Transvaal samples, three (Nos. 37, 39, and 43) have a very large proportion of their ash constituents made up of phosphoric oxide.

Grouping the samples by Provinces, we find that those from Natal (Nos. 45 to 51) average highest, namely, 47.89 per cent., or, if we exclude No. 51, 48.73 per cent. On the other hand, the twelve Orange Free State samples (Nos. 19 to 30) average the lowest of any Province, namely, 38.65 per cent. The twelve samples of whole maize from the Transvaal (Nos. 33 to 44) average 44.88 per cent. The nine samples of whole maize from the Cape Province (Vryburg District excluded), Nos. 2, 4, 6, and 9 to 14, average 43.98, but the average for the four Vryburg samples (Nos. 15 to 18) is 46.27 per cent.

This question of phosphoric oxide in maize has an important bearing, not alone on stock feeding, but also on human dietaries, as I shall now proceed to explain.

Some months after I had stated, in my Annual Report for 1910, that it was my intention, in the course of the general investigation of the composition of cereals grown in South Africa, to deal with maize as oats and wheat had been dealt with, an article entitled "Scurvy and Beri-beri; an etiological comparison and deduction,"* by Dr. P. A. Nightingale, was published. Arguing from the close affinity between beri-beri and scurvy, discarding the theory that the former was caused by the *presence* of a toxin generated in the surrounding soil, and accepting the view that it was due to a *defect* in the white steam-milled rice of commerce, Dr. Nightingale proceeded to point out that, in one of the Rhodesian mining districts, the natives who had previously been fed on hand-ground rapoko (*Eleusine coracana*), their staple diet, had, instead, been supplied with very finely ground, first-class steam-milled mealie meal imported from a district where scurvy was known to exist. The result was a speedy outbreak of scurvy on the mine. The import of mealie meal was thereupon stopped and the scurvy disappeared. Dr. Nightingale suggested that the maize was the direct cause of the scurvy, either through a fungoid affection, or by having become defective in nutriment in the process of milling. By way of a possible analogy he directed attention to the report of Dr. Highet, Principal Medical Officer of the Government of Siam, who had found that parboiled unhusked rice acted as a prophylactic against scurvy, and that this was due, not to sterilization during boiling, but to the retention of a considerable proportion of the pericarp, i.e. of the oil-bearing layers of the seed. Dr. Nightingale's final hypotheses were that scurvy is due either to—

(1) a fungus growing on the mealie;
(2) a fault in the milling of the grain; or
(3) a combination of both these causes.

In a later publication† Dr. Nightingale made further reference to the disease resulting from a diet of defective mealie meal and assigned to that disease the name "zëism," giving a description of the disease, accompanied by an illustration.

Meanwhile I had made preliminary arrangements for an investigation of South African grown maize, and Mr. J. Burtt-Davy, Government Botanist, had kindly consented to procure samples of typical maize from various parts of the Union for analysis. Just at this stage the Department received a communication on the feeding of mine natives from Dr. Macaulay, M.L.A., bearing on the subject and suggesting the very investigation that was being initiated. Dr. Macaulay drew attention to the frequency of scurvy amongst the natives on the mines and to their generally lowered vitality as evidenced by proneness to acute infectious disease, the virulent course of such affections, and the tardy healing of incidental wounds and ulcers. All this he attributed to some unknown cause interfering with the nutrition of the nervous tissues, and, as a result thereof, diminishing bodily resistance to processes which are of morbid tendency, and delaying those which are recuperative. He also drew analogies with beri-beri, and with the similar affections (polyneuritis) capable of being experimentally produced in animals fed

* *Transvaal Med. Journ.*, Vol. 6, No. 9 (April 1911), pp. 193–196.
† *Transvaal Med. Journ.*, Vol. 7, No. 12 (July 1912), pp. 261, 262.

on grain deprived of certain parts. He emphasized the point that both in beri-beri and in polyneuritis the presence or absence of the organic compounds of phosphorus in the grain was a controlling factor, and these phosphorous compounds are contained mainly in the outer layers of the grain and in the germinal portions.

Now, in the case of rice, 100 parts of the whole grain yield about 62.5 of "white rice," 12.5 of "polishings," and 25.0 of "husk." The white rice contains .277 per cent. of phosphoric oxide, while in the polishings there is as much as 4.200 per cent., and it has been found that where beri-beri has appeared it can be cured—or if it has not appeared it can be prevented—by adding a sufficiency of polishings to the white rice in which phosphorus is lacking.*

This line of reasoning Dr. Macaulay applied to the mine natives and their mealie diet, and urged investigation accordingly. In fact, he had already taken certain steps on his own account in this direction. He procured samples of whole and unground maize from different sources, and these were analysed in the Government Laboratories at Johannesburg. In one case he found that while the whole maize contained .55 per cent. of phosphoric oxide, the fine meal contained only .44 per cent., while the seconds, bran, and waste all contained .70 per cent., or more, rising to .79 per cent. in the "waste." That meant that in the process of milling the grain lost 20 per cent. of its original phosphoric oxide. Dr. Macaulay also had analyses made of the meal milled for the natives' food on one of the mine groups and found that, while there was only .400 per cent. of phosphoric oxide in the meal itself, the "waste" contained as much as 1.054 per cent.

The late Dr. E. B. Voorhees, in Bulletin No. 105 of the New Jersey Agricultural Experiment Station, gives the following differential analysis of maize, in so far as its phosphoric oxide content is concerned:—

| | | |
|---|---|---|
| Whole seed ... ... ... | .83 | per cent. |
| Husk ... ... ... ... | .23 | ,, |
| Germ ... ... ... ... | 6.16 | ,, |
| Endosperm ... ... ... | .35 | ,, |

It is to the loss of the phosphoric oxide mainly contained in the germ that Dr. Macaulay attributes the prevalence of certain forms of disease amongst the mine natives, and hence it is of interest to find that, for instance in Nos. 3, 5, and 32 of the above table of analyses of South African maize, it is not impossible to procure meal containing the high percentage of .800 to .850 of phosphoric oxide.

In the course of his inquiries, Dr. Macaulay found that the agriculturist has an even more direct interest in this whole question than may appear at first sight. The milling usually practised, he found, was wasteful, the fine meal amounting to only 86 per cent. of the grain, i.e. a loss of 14 per cent. He therefore endeavoured to have a meal milled containing 96 per cent. of the original grain. but the result was rather disappointing. The millers informed him that

* J. M. Little, in the *Journal of the American Medical Association*, 1912, Vol. 58, No. 26, pp. 2029, 2030, attributes an outbreak of beri-beri in Newfoundland and Labrador to a diet consisting almost exclusively of *white flour*, tea, and molasses, necessitated by a shortage of other food supplies. He recommended a substitution of whole wheat flour, and expressed the view that, the more the diet is restricted to flour, the more necessary it is hat it should be the flour of *whole* wheat.

the new season's mealies were supplied to them in *so damp a condition* that it was impossible to get a 96 per cent. product, and so not only a *large proportion*, but much of the *most valuable part* of the grain was still being lost, and it was practically impossible to mill the grain to best advantage.

The subject has yet another bearing. Quite recently Mr. A. Stead, of the Government Laboratories at Bloemfontein, discussed* the analogies between beri-beri and lamziekte. Mr. Stead refers (p. 389) to my having pointed out about twenty years ago that *phosphoric oxide* was lacking in the soils of certain areas where lamziekte prevailed; he also mentions (p. 391) the subject of phosphoric oxide in rice polishings, and expresses his conviction that lamziekte originates in the absence of a "protective" substance, in some way associated with phosphoric oxide, in the vegetation of lamziek areas. But, at the same time, he refers definitely (p. 390) to a *protein*-deficient diet as regards both lamziekte and beri-beri. To some this may seem to be ascribing the disease to the absence of two wholly distinct substances, but though it may be too early to dogmatize regarding the actual cause or controlling factor, it will be remembered that in grain production—for I am not now discussing the indigenous Karroo vegetation—there is a very intimate association between nitrogen and phosphorus. If, in the course of investigation, we should be puzzled at finding that in some cases a protein diet and in others a phosphatic diet does not suffice to avert the ailment, it should be borne in mind that the nucleo-proteins and the phospho-proteins,† bodies in which nitrogen and phosphorus are in actual combination, occur in animals as well as in plants, and so there is the possibility that a combination of this sort, rather than nitrogen or phosphorus independent of each other, may be that which is lacking. A plant food may be rich in nitrogen and yet poor in *phospho*-nitrogen, or it may have comparatively much phosphorus and yet lack phospho-*nitrogen*, and in either case the animal would miss an essential nutritive element. Phosphorus plays an important part in plant germination, and it is in the protoplasm of the vegetable cell, particularly in the cell nucleus, that the proteid substance called nuclein, which contains, besides nitrogen, a considerable proportion of phosphorus, is found. Zaleski claims to have proved‡ that the production of nucleo-proteins takes place in all growing cells, and that a considerable increase was observed in the growing portions of *Zea mays*. The conclusion was drawn that the nucleo-proteins are formative substances which have a share in the production of protoplasm. If in the milling process these germinal portions are thrown aside as waste, one of the fundamental elements of the feed is lost. At all events one important feature that the foregoing results have brought out is that in many parts of this country the percentages of protein and phosphoric oxide in the air-dried grain tends to be lower than in the article imported from overseas. Though this may be an advantage to the brewer who wishes to utilize Cape barley, it is the reverse where the grain is to be employed as fodder, and one has to

* "Some Chemical Reflections concerning Lamziekte," *Union Agricultural Journal*, Vol. 5, No. 3 (March 1913), pp. 386–392.

† These are two distinct series of substances. See Plimmer and Scott: *Journ. Chem. Soc.*, 1908, Vol. 93, p. 171.

‡ *Ber. Deut. Bot. Gesellschaft*, 1911, Vol. 29, pp. 146–155.

take into account its muscle-forming capabilities. And so we are naturally led to inquire, on the one hand, which varieties of barley contain least proteins, and, on the other, which varieties of maize furnish most proteins and phosphates. These are the varieties that we would be led to cultivate in order that each may attain his special object. To answer these inquiries we need yet further investigation, but when we know the lines that such investigation should take, and when the people most interested realize what these lines ought to be and are willing to consider themselves partners in the enterprise of pushing them to a successful issue, then success is already half assured. The difficulty is to set the first course; what remains needs only perseverance, and, compared with the initial difficulties, that is comparatively easy.

[ERRATA.—In the September instalment of the above article the percentages of phosphoric oxide of Nos. 15, 16, 17, 18 should not be, as stated on page 495, respectively .23, .21, .23, and .25, but should read .56, .44, .51, and .65. The percentage of phosphoric oxide in the Transvaal and Vryburg samples in the tables on page 499 should read, in the first table, .53 instead of .45, and in the second table .58 instead of .49.]

# The Cheese-making Industry.

By E. G. HARDY, Acting Superintendent of Dairying.

AFTER a number of years spent in what has really amounted to experimental work, the cheese-making industry can now be said to show healthy signs of development which in the near future is fairly certain to increase rapidly and make this branch of dairying a greater source of revenue to our dairy farmers, and at the same time prove an increasing asset to the country. A process of manufacture has now been evolved to produce a cheese of the cheddar type, which, it can with confidence be stated, is able to hold its own in competition with the imported article in the open market.

What is now required is a much larger and more regular output of colonial cheese, so that merchants dealing in this commodity can rely on obtaining sufficient supplies for their requirements throughout the year. So long as our South African factories can only supply the demands of the trade for a few months of the year, merchants are compelled to import the balance needed, and, as they cannot run the risk of running short of supplies, more cheese is at times imported into this country than is actually required. The result is that the market occasionally becomes overstocked and the sale for the colonial cheese is detrimentally affected.

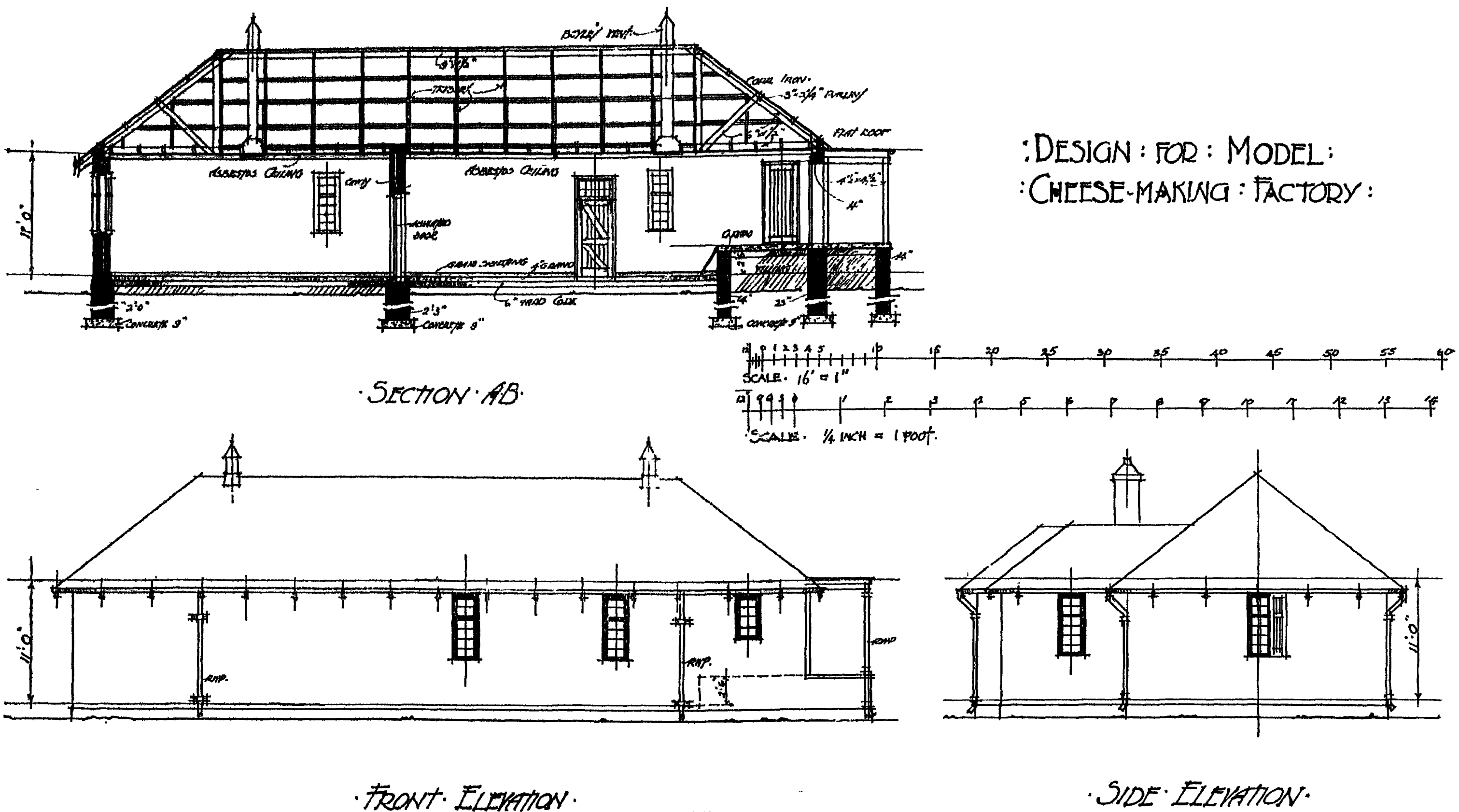
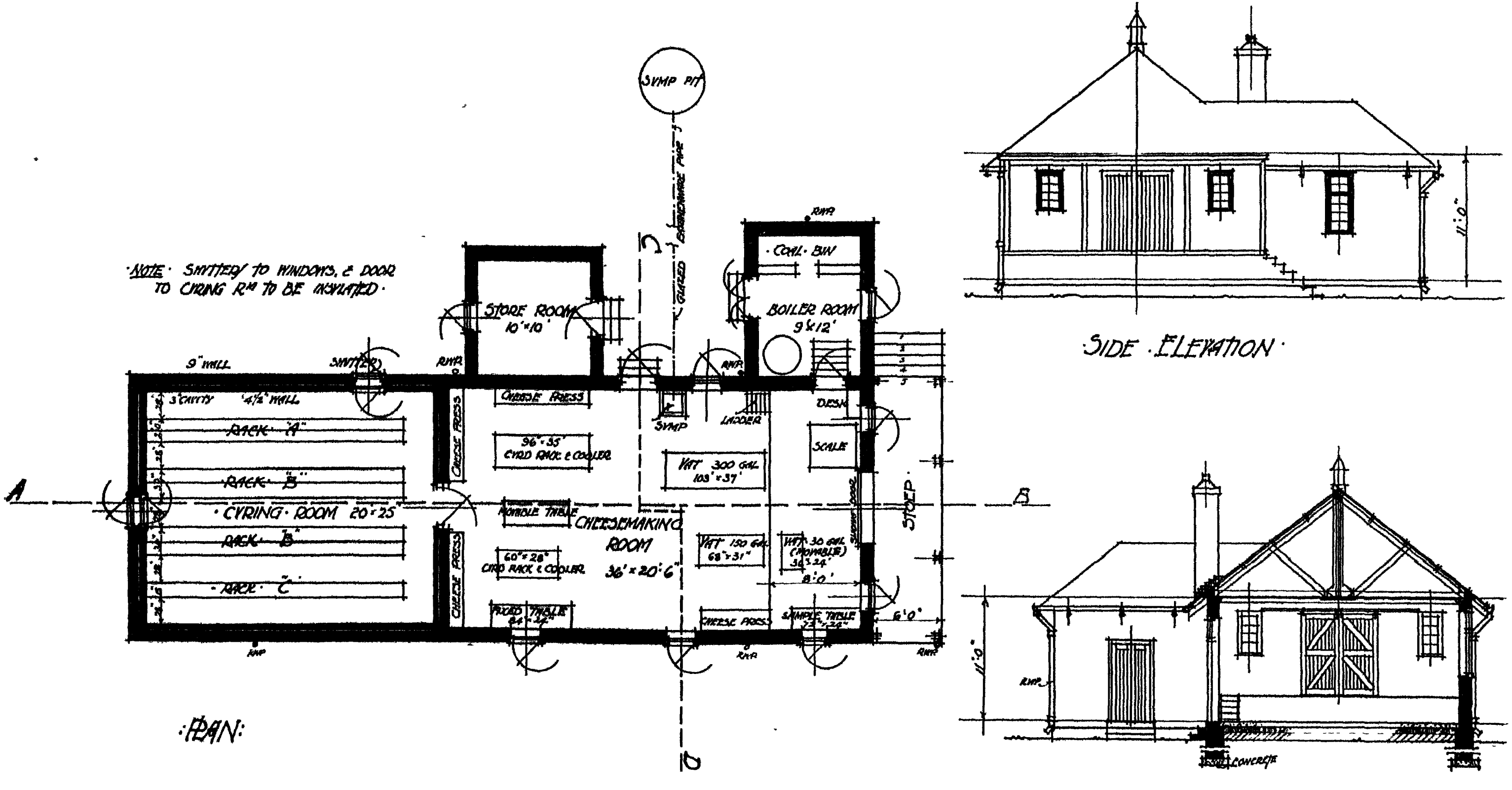

:DESIGN : FOR : MODEL:
:CHEESE-MAKING : FACTORY:
·SECTION·AB·
Asbestos Ceiling
Asbestos Ceiling
Corr. Iron.
Flat Roof
11'0"
Concrete 9"
Concrete 9"
Concrete 9"
6" Hard Core
SCALE· 16' = 1"
SCALE· 1/4 INCH = 1 FOOT.
·FRONT·ELEVATION·
11'0"
·SIDE·ELEVATION·
11'0"

Fig. 1.



NOTE · SHUTTERS TO WINDOWS, & DOOR TO CURING R^M TO BE INSULATED ·
SUMP PIT
STORE ROOM 10'×10'
BOILER ROOM 9'×12'
· COAL · BIN
9" WALL
3" CAVITY
4½" WALL
RACK "A"
RACK "B"
CURING · ROOM 20'×25'
RACK "B"
RACK "C"
CHEESE PRESS
96"×35" CURD RACK & COOLER
MOVABLE TABLE
60"×28" CURD RACK & COOLER
FIXED TABLE
CHEESEMAKING ROOM 36'×20'6"
VAT 300 GAL 103"×37"
VAT 150 GAL 68"×31"
VAT 30 GAL (MOVABLE) 36"×24"
SUMP
LADDER
DESK
SCALE
SAMPLE TABLE
STOEP
6'0"
8'0"
:PLAN:
SIDE · ELEVATION ·
11'0"
SECTION C·D ·
CONCRETE


Fig. 2.

I have on several occasions been informed by cheese merchants that they would be quite willing considerably to reduce their importations of cheese of the cheddar type, and even gradually cease importing altogether, if guaranteed a sufficient and regular supply of first-class colonial cheese for their requirements at a price not exceeding the landed cost of the imported article. It may be stated here that cheese can be manufactured and sold on the large markets in this country, profitably, at the prices realized for the imported article during the past few years.

The value of cheese imported into the Union during the eight months ended 31st August, 1913, was £115,543, being an increase of £11,646 over the corresponding period in 1912; which conclusively proves, not only that the manufacture of colonial cheese must greatly increase before the imported article can be dispensed with, but that the consumption is also increasing more rapidly than the local output.

Unlike creameries, cheese factories are not entirely dependent on railway communication for their success, and there are, without doubt, many districts in South Africa in which, although favourable to the raising of cattle and dairy farming, the farmers have no profitable means of disposing of the milk produced, and consequently have no encouragement to produce it, as they are situated too far from a railway and at too great a distance by road to allow of their sending cream to a creamery with any likelihood of its arriving in first-class condition. It is such districts that are particularly adapted to the establishment of cheese factories.

It may be contended that in such a district a creamery could be established with an equal probability of success. Such, however, would not be the case, as it requires a much larger capital expenditure to start a creamery; and the quantity of cream obtainable, without railway facilities, would almost certainly not be sufficient to enable it to work at a profit; whereas, wherever an average supply of 300 gallons of milk per day for six months in the year could be obtained within a radius of from eight to ten miles of the cheese factory it is intended to erect, a fair measure of success could be looked for, provided, of course, the article turned out is of good quality.

The fact that many inquiries have recently been received by this Division from farmers, asking for information concerning the erection and establishment of cheese factories, shows that they are beginning to realize the possibilities of cheese-making as a profitable way of disposing of their milk, and it is considered, therefore, that the time has now arrived when plans of a cheese-making factory may be useful. With this object in view, the conditions prevailing in most parts of the Union have been carefully studied and the accompanying set of plans for a cheese factory, capable of handling 300 gallons of milk per diem, detailing the various rooms required, with the necessary plant and machinery erected in position, and giving full particulars of the arrangement for shelving in the curing-room, have been specially prepared for the information and guidance of those interested.

Before dealing with the construction of the cheese factory, it may be well to mention a few points which should be considered in the selection of a site for same, viz.:—

1. Select a well-drained site and one situated high enough to allow of drainage from the factory by gravitation.

2. There should be a good water supply in the vicinity, which, if it can be delivered to the site by gravitation, is a decided advantage.
3. The factory should be situated in a pure atmosphere and away from any bad odours such as might arise from marshes, stagnant water, stables, pig-styes, etc.
4. A southern aspect is desirable.
5. The site should be convenient for the import of milk and the export of produce; as near as possible to a good road; and convenient for milk suppliers to deliver their milk.

As regards material used in construction of the building:—

(*a*) *Walls* are best built of brick, 14 in. wide, but if stone is cheaper and more easily obtainable it can be used, in which case, however, the walls must be 18 in. wide.

The construction of the ripening or curing room is most important, as it is here that the newly made, or green, cheese is kept for three or four months while the process of maturing takes place, and whether this will be normal or satisfactory depends to a considerable extent on being able to keep the room cool. Cheese will not ripen properly in high temperatures, and 64° F. has been found to be the limit. It is therefore necessary in a hot climate such as ours to take steps to ensure this. Of course, artificial refrigeration would easily give the desired temperature, but the cost of refrigerating machinery is high, and the cost of maintenance and running same are higher than the average cheese factory could support, so that if made a *sine qua non* I fear very few cheese factories would be started, and fewer still run at a profit. With the object of keeping this room, therefore, as cool as required, it will be seen on reference to the plans (Figs. 1 and 2) that it is built with what are known as "cavity walls," that is, two walls built side by side with a dead-air space between, the outside wall being 9 in. wide, and the inner wall 4½ in. wide, with a dead-air space of 3 in. between the two; this method has been found satisfactory in most districts, but for very hot localities it is probable that we may have to devise a room which can be kept cool by evaporation, particulars of which it is hoped to publish in a later issue of the *Journal*.

The windows of the curing-room, it will be noted, are fitted with insulated shutters, and the door is insulated to assist in keeping the temperature down.

(*b*) *Roof*.—The construction of this is clearly shown in Section *ab* (Fig. 1). Special note, however, should be taken of the two ventilating shafts which run through the roof, one each into the ripening and making room, and are fitted with Boyle's ventilators where they emerge from the ridge of the roof.

(*c*) *Floors*.—It is very important that these should be well laid and made quite impervious to moisture, finished off with a smooth surface of granolithic or cement that can easily be kept clean, and with sufficient fall in the making-room towards the sump to enable all water to drain into it. About 1 in 72 is advisable. The actual construction of the floors is shown in Section *ab* (Fig. 2).

The arrangement of shelving in the curing-room is shown in Figs. 3 and 4. Rack A (Fig. 3) is to carry 20-lb. cheese, Racks B (Fig. 4) are to carry 40-lb. cheese, and Rack C (Fig. 3) is to carry 7 and 10 lb. cheese. The wood used for the shelving

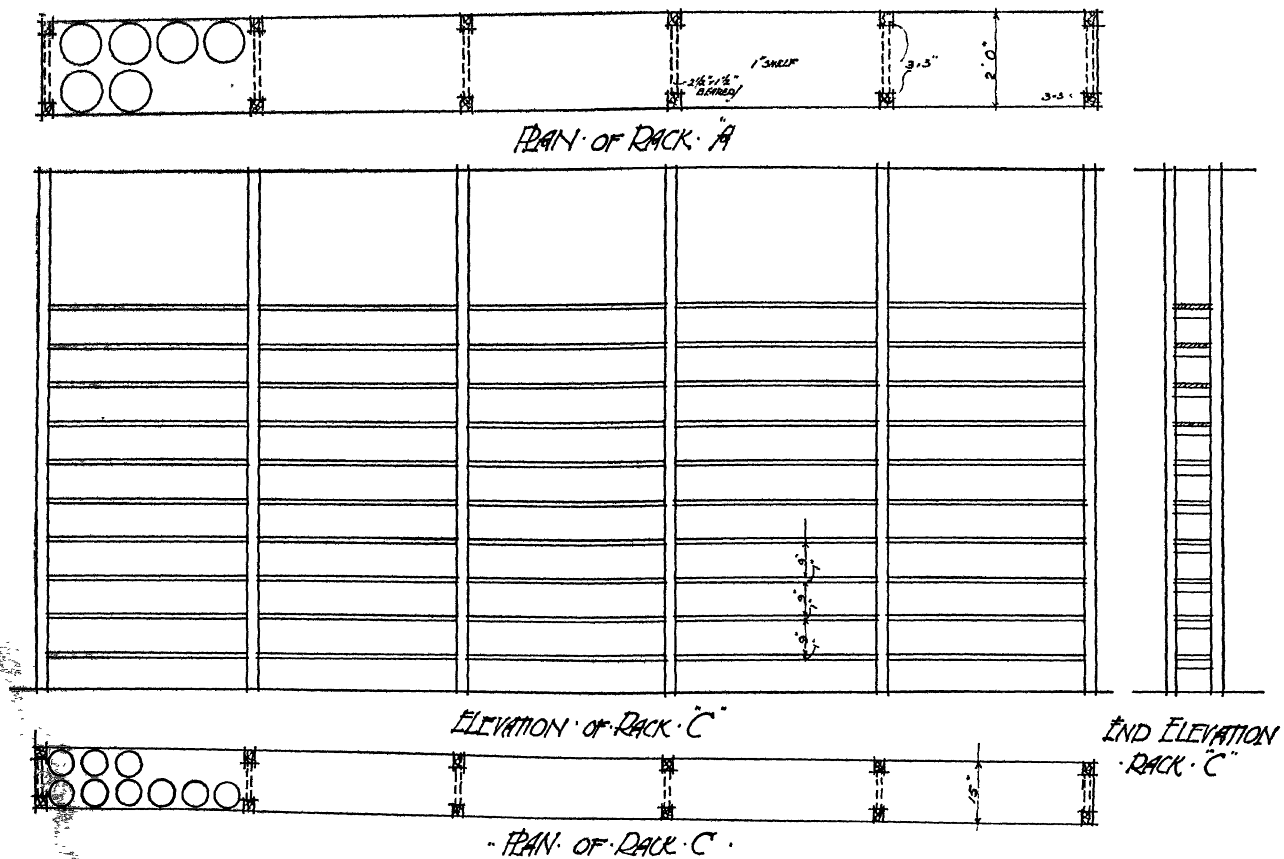
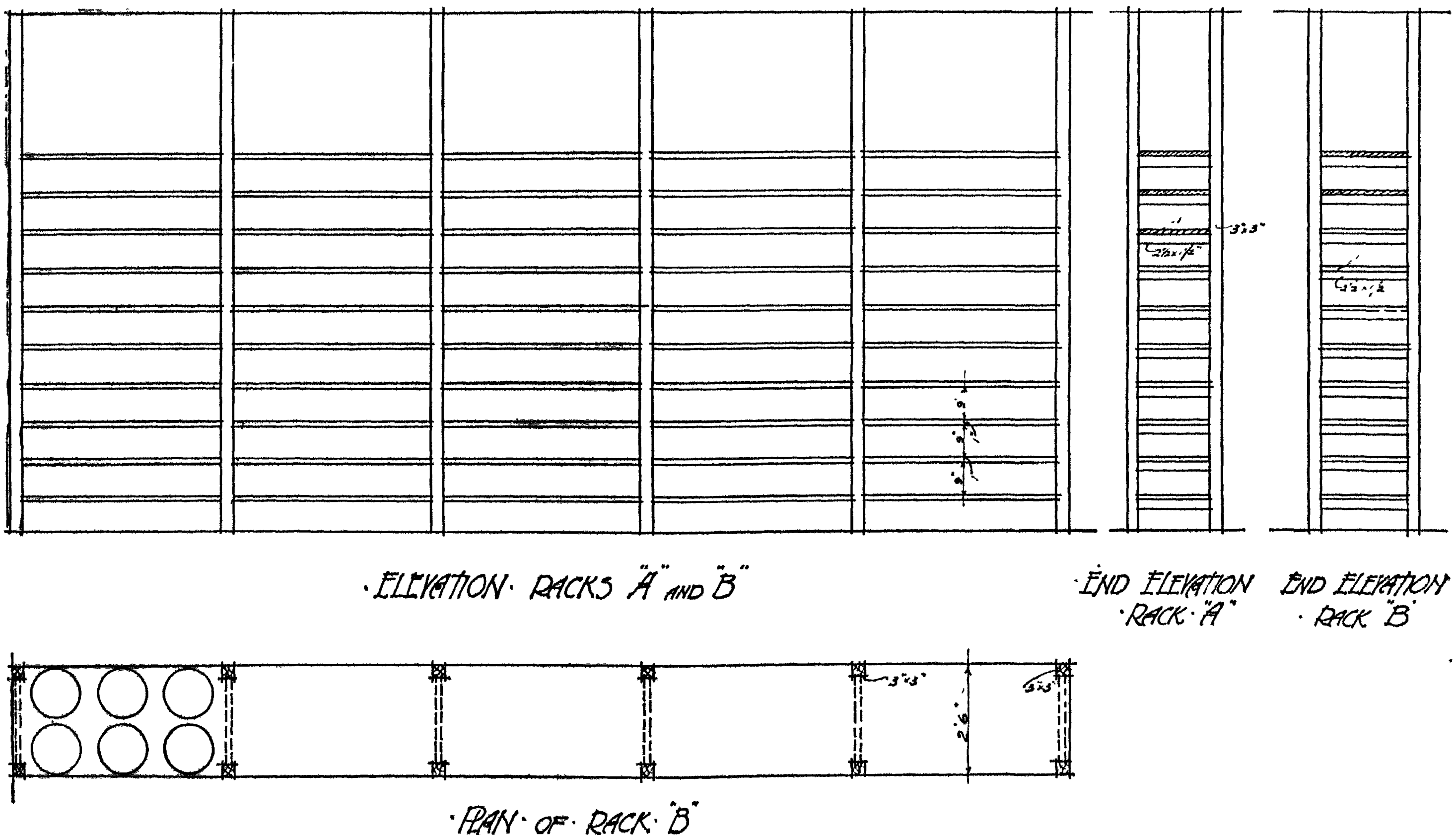

1" SHELF
2½"×1½" BEARER
3.5"
2'0"
3.5
PLAN · OF RACK · "A"
ELEVATION · OF · RACK · "C"
END ELEVATION
· RACK · "C"
15"
· PLAN · OF · RACK · C ·

Fig. 3.


3"x3"
2½"x½"
·ELEVATION· RACKS "A" AND "B"
·END ELEVATION ·RACK·"A"
END ELEVATION · RACK "B"
3"x3"
2'6"
·PLAN· OF· RACK· "B"
Fig. 4.

must be hard and close-grained, and absolutely free from any smell or taste which, if existent, would be easily assimilated by the cheese; teak or Californian red wood is good for this purpose.

It is not proposed to state here the cost of erection of a cheese factory according to the plans hereby given, as this must necessarily vary greatly according to the locality in which the factory is to be erected, the distance from the railway and from the coast, as well as the distance the bricks or stone of which it is to be built have to be carted. Any figures given might only be misleading, as they can be more accurately arrived at by those resident in the district where a cheese factory is to be erected.

I regret that space will not permit of my dealing in this issue with the plant and machinery required in a cheese factory, but particulars thereof will appear later, together with hints on the manufacture of cheddar cheese in South Africa, which may, I trust, be helpful to those already engaged in the industry. It must, however, be borne in mind that cheese-making involves a process which is exceedingly complicated and cannot be learnt from articles or books, but can only be successfully carried out after long practice and experience and a sound knowledge of the sciences on which the various operations are based. The importance of obtaining a fully qualified man as manager of a cheese factory is therefore obvious, the success of the venture being to a large extent dependent on him.

In conclusion, it may be stated that the Division of Dairying will be pleased to render every assistance possible to any farmers who may wish to combine for the purpose of starting a cheese factory, and will send an officer to visit their district and advise them as to the possibilities and likelihood of success of any such proposed venture; it is, in fact, strongly urged that such advice be first obtained before any definite steps be taken, and, if it be decided to proceed with the proposed undertaking, further advice and assistance will then be given in regard to the erection of the building, selection of the plant, and, if in a position to do so, in the securing of a suitable and qualified man as manager, while advice as regards the actual manufacture will always be available when desired.

# Rural Notes.

## Free Freight for Stock.

The attention of shippers of live stock under the "free freight" clause of the Ocean Mail Contract is directed to the fact that they will in future be required to observe the following conditions, which are to be read in conjunction with the regulations published by Government Notice No. 723, dated the 30th April, 1913, viz.:—(*a*) No stock under the age of eight months will be accepted for shipment under the free freight clause. (*b*) In the interest of the live stock and to minimize the risk of miscarriage to pregnant animals under the conditions of a sea voyage, mares in foal will not be accepted for shipment after the sixth month and cows after the fifth month of pregnancy. (*c*) In the case of pregnant animals the veterinary certificate submitted to the High Commissioner must specify the degree of the animal's pregnancy. (*d*) Having regard to the great difficulties experienced on board ship in tending very young calves and foals, these when accompanied by their dams will only be accepted for shipment on payment of the Union-Castle Company's usual rates of freight for such young animals. (*e*) To avoid confusion on delivery there must be distinctive marks on the horns or hoofs of the animals or such other unmistakable marks (of a nature not to be effaced or removed in the course of the voyage, and to be duly entered in the description of the animal) as would obviate any mistake as to their identity, thus: *Cattle.*—To be branded with number on horn and letter corresponding to the first letter in the surname of the owner. (Polled cattle and young animals without horns to be similarly branded on hoof.) *Horses.*—To be similarly branded on foot. *Pigs.*—If not ear-tagged to have owner's name stencilled on crate. *Sheep.*—Same as pigs. In all cases these identification marks should appear on the pedigree or other certificates. (*f*) Considerable trouble having been experienced by the company owing to exporters of live stock being insufficiently acquainted with shipping procedure, such exporters are strongly urged to employ some regular shipping agent to carry out the necessary formalities. (*g*) The certificate of approval issued by the High Commissioner and the relative documents must be lodged with the Union-Castle Steamship Company at least *seven* days before the stock is required to be delivered alongside the steamer.

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## Results of Maize Experiments.

The results of experiments with maize, conducted during the past season at the Rustenburg and Piet Retief Experiment Stations (attached to the Division of Tobacco and Cotton) are now to hand, and are set forth in the accompanying tables. In connection with the Piet Retief experiments, it is interesting to observe that the acid phosphate plots are in advance throughout, and that Plot No. 4,

unlimed, and treated with phosphates only, takes first place. This plot received the cheapest fertilizer used, costing about 6s. Three crops have been grown from the one dressing of fertilizer, and the fourth crop yields 828 lb. of mealies from one-quarter of an acre, equal to 16½ bags per acre. The same plot also gave the best results in all previous crops. All the plots received the same attention, having been cultivated four times during the season. The soil is a brown loam and was ploughed an average depth of ten inches. Furrows were made and kept open between each plot to prevent any soil or fertilizer washing from one plot to another. The distance between plots is six feet. The mealies were planted in drills three feet apart and an average distance of two feet ten inches in the drill. The crop came up very uniform, but the plots treated with phosphates soon took the lead both in growth and colour, and remained so throughout.

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## MAIZE EXPERIMENTAL ROTATION PLOTS.

*Piet Retief, Season* 1912-13.

| Plot Number. | | Gross Weight per Plot. | Mealies on Cobs per Plot. | Shelled Mealies per Plot. | Average Height of Stalk. | | Gross Weight per Acre | Shelled Mealies per Acre. | Number of Bags per Acre. |
|---|---|---|---|---|---|---|---|---|---|
| | | lb. | lb. | lb. | ft. | in. | lb. | lb. | |
| 1. | Limed ... | 375 | 83 | 62¼ | 4 | 3 | 1500 | 249 | 1¼ |
| | Unlimed | 291 | 70 | 52½ | 4 | 3 | 1164 | 210 | 1 |
| 2. | Limed ... | 654 | 210 | 157½ | 4 | 3 | 2616 | 630 | 3 |
| | Unlimed | 611 | 162 | 121½ | 4 | 3 | 2044 | 486 | 2 |
| 3. | Limed ... | 528 | 156 | 117 | 4 | 3 | 2112 | 468 | 2 |
| | Unlimed | 541 | 156 | 117 | 4 | 3 | 2164 | 468 | 2 |
| 4. | Limed ... | 1035 | 475 | 378 | 6 | 0 | 4140 | 1512 | 7½ |
| | Unlimed | 1950 | 1048 | 828 | 8 | 0 | 7800 | 3312 | 16½ |
| 5. | Limed ... | 545 | 188 | 141 | 4 | 3 | 2180 | 564 | 2¼ |
| | Unlimed | 445 | 150 | 112½ | 4 | 3 | 1780 | 450 | 2¼ |
| 6. | Limed ... | 446 | 129 | 97 | 4 | 3 | 1784 | 388 | 1¾ |
| | Unlimed | 493 | 173 | 130 | 4 | 3 | 1972 | 520 | 2½ |
| 7. | Limed ... | 1898 | 847 | 670 | 8 | 0 | 7592 | 2680 | 13¼ |
| | Unlimed | 1527 | 919 | 735 | 8 | 3 | 6116 | 2940 | 14½ |
| 8. | Limed ... | 1493 | 694 | 555 | 8 | 3 | 5972 | 2220 | 11 |
| | Unlimed | 1660 | 822 | 657½ | 8 | 3 | 6640 | 2630 | 13 |
| 9. | Limed ... | 1560 | 801 | 641 | 8 | 3 | 6240 | 2564 | 12½ |
| | Unlimed | 1654 | 845 | 676 | 8 | 6 | 6616 | 2704 | 13½ |
| 10. | Limed ... | 1294 | 618 | 494 | 7 | 0 | 5176 | 2472 | 12 |
| | Unlimed | 1070 | 441 | 355 | 7 | 0 | 4280 | 1764 | 8½ |
| 11. | Limed ... | 1216 | 428 | 321 | 4 | 6 | 4864 | 1712 | 8½ |
| 12. | Limed ... | 742 | 300 | 222 | 4 | 6 | 2968 | 1200 | 6 |
| | Unlimed | 568 | 183 | 138 | 4 | 0 | 2272 | 732 | 3½ |

NOTE.—Plot No. 11 is limed throughout the half acre and is treated as one plot whilst all the others are one-quarter acre plots.

MAIZE FERTILIZER EXPERIMENT.

*Rustenburg, Season* 1912-13.

| Plot Number. | | Weight of Mealies on Cob | Weight of Grain. | Weight of Cob. | Loss in Shelling. | Percentage of Grain. | Percentage of Cob. | Weight of Grain per Acre. | Number of Bags per Acre. |
|---|---|---|---|---|---|---|---|---|---|
| | | lb. | lb. | lb. | lb. | | | lb. | |
| 1. | Limed ... | 471 | 421½ | 58½ | +8¼ | 89·49 | 11·73 | 1686 | 8·43 |
| | Unlimed | 457¾ | 384½ | 54¾ | 18½ | 87·21 | 12·5 | 1538 | 7·69 |
| 2. | Limed ... | 479 | 402¾ | 58¾ | 17½ | 81·8 | 12·73 | 1611 | 8·06 |
| | Unlimed | 412 | 349 | 53¼ | 9¾ | 86·76 | 13·23 | 1396 | 6·98 |
| 3. | Limed ... | 436 | 377½ | 51¼ | 7¼ | 87·75 | 11·93 | 1510 | 7·55 |
| | Unlimed | 413¾ | 359½ | 49¾ | 4½ | 85·76 | 11·86 | 1438 | 7·19 |
| 4. | Limed ... | 435¾ | 373¼ | 52 | 10 | 87·66 | 12·21 | 1493 | 7·46 |
| | Unlimed | 626¼ | 539¾ | 74¼ | 12¼ | 87·0 | 12·0 | 2159 | 10·80 |
| 5. | Limed ... | 363¼ | 313¼ | 44¾ | 5¼ | 87·0 | 12·75 | 1253 | 6·27 |
| | Unlimed | 380¼ | 325½ | 49¾ | 5 | 86·74 | 10·59 | 1302 | 6·51 |
| 6. | Limed ... | 431½ | 369¼ | 51¼ | 11 | 87·81 | 12·18 | 1477 | 7·39 |
| | Unlimed | 243¾ | 210¾ | 29¾ | 2½ | 87·35 | 12·34 | 843 | 4·22 |
| 7. | Limed ... | 382¾ | 331 | 46¼ | 5½ | 87·74 | 12·2 | 1324 | 6·62 |
| | Unlimed | 384¼ | 295¾ | 41¼ | 11¼ | 87·8 | 12·2 | 1183 | 5·92 |
| 8. | Limed ... | 367¾ | 318 | 45¾ | 4 | 87·42 | 12·57 | 1272 | 6·36 |
| | Unlimed | 376 | 321½ | 48¼ | 6¼ | 86·95 | 13·04 | 1286 | 6·43 |
| 9. | Limed ... | 410½ | 344½ | 49½ | 16½ | 89·73 | 10·02 | 1378 | 6·89 |
| | Unlimed | 390½ | 336½ | 48¾ | 5¼ | 87·34 | 12·65 | 1346 | 6·73 |
| 10. | Limed ... | 312¼ | 269 | 38¼ | 4¾ | 87·19 | 12·47 | 1076 | 5·38 |
| | Unlimed | 394 | 340 | 47¾ | 6¼ | 87·66 | 12·31 | 1360 | 6·80 |
| 11. | Limed ... | 632¾ | 548¾ | 75¾ | 8¼ | 88·5 | 11·35 | 1097½ | 5·49 |
| 12. | Limed ... | 274¼ | 236¾ | 34½ | 3 | 86·35 | 12·71 | 1051 | 5·26 |
| | Unlimed | 146 | 132¼ | 20¼ | +6½ | 90·58 | 13·86 | 529 | 2·65 |

**Potchefstroom Maize Harvest.**

The following is the result of the maize harvest at the Experimental Farm, Potchefstroom. The yields have been based on the returns from one acre of an average stand weighed from each field:—

| Field. | Variety. | Acres. | Yield per Acre (bags). | Approximate Number of Bags. |
|---|---|---|---|---|
| 5 | Mercer ... ... ... ... ... | 5½ | 12 | 66 |
| 5 | Snow Flake ... ... ... ... | 3¾ | 9·4 | 31 |
| 5 | Palm's Corn Flake... ... ... ... | 3¾ | 12 | 45 |
| 5 | Snow White Dent... ... ... ... | 3¾ | 10 | 37 |
| 5 | Fink's Yellow Dent ... ... ... | 3¾ | 11 | 41 |
| 6 | Potchefstroom Pearl ... ... ... | 21½ | 8·8 | 189 |
| 7 | " " ... ... ... | 27 | 10 | 270 |
| 10 | Hickory King ... ... ... ... | 25 | 9·25 | 231 |
| 12 | Chester County Mammoth ... ... | 27 | 7·4 | 200 |
| 15 | Iowa Silver Mine ... ... ... ... | 27 | 14 | 378 |
| 16 | Yellow Cango (red cob) ... ... ... | 5½ | 10·75 | 59 |
| 16 | New England ... ... ... ... | 4½ | *8 | 34 |
| 18 | Reid's Dent ... ... ... ...<br>Yellow Cango ... ... ... ...<br>Johnston's County ... ... ...<br>Natal Horsetooth ... ... ... ... | 32 | *8 | 288 |
| 20 | Eureka ... ... ... ... ... | 30 | 7·75 | 232 |
| | | 220 | * Estimated. | 2101 |

Average yield per acre ... 9·5 bags.

**South African Industrial Exhibition.**

Arrangements are now complete for holding an exhibition of South African manufactures in Capetown in February of next year. The general exhibition committee, assisted by the various committees appointed to carry out the detailed work of organization, have the matter well in hand, and negotiations are proceeding rapidly. The project is receiving the support of the Government, and arrangements will be made for the display of products from the various experimental farms of the Union. His Excellency the Governor-General has kindly consented to become honorary patron of the exhibition and to perform the opening ceremony, whilst the Prime Minister (General Botha) has accepted the position of honorary president. The vice-presidents include members of the Ministry, the Administrators of the various Provinces, and other prominent gentlemen. The members of the Manufacturers' Associations in the Transvaal and Natal have decided to erect special exhibits showing the varied industries being operated in those Provinces, and organizers in Johannesburg and Durban will have control of the sections devoted to these displays. This all goes to show the interest evinced in the scheme. From the point of view of the industrialist, and the man who has the interest of his country at heart, the exhibition will mark an epoch in the industrial development of the Union. Since 1908, when industrialism was emerging from the chrysalis stage, there has been no attempt made to bring together under one roof a collective display of the products of South Africa, which, embraced under the name of "industries," already play so large a part in our economic life. The promises of support received from all over the Union point to the value that is attached to the exhibition as a medium for demonstrating how deep a root industrialism has taken in our economic soil. That a capital of some £50,000,000 has already been invested in manufactures shows to what extent development has taken place, and the exhibition will be a concrete illustration of how it is possible under enlightened conditions to build up in South Africa a flourishing industrial community which is the mainspring of a country's prosperity.

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In addition to industrial exhibits, there will be a special hall which will house a feature of great interest, namely, machinery in motion. This hall will be prepared with the idea of showing machinery at work exactly as in use in factories in the Union. This exhibit will command wide attention. Another feature of special importance will be the home industries section. Probably in no country in the world are the home industries so diversified and popular as in South Africa, and this section will be replete with exhibits specially secured and arranged for the purpose. An additional feature of interest will be the court of arts, in which will be exhibited a collection of the choicest specimens of South African art, embracing painting, sculpture, and clay modelling, ever assembled in one place in South Africa, as it is hoped the event will incorporate the annual picture exhibition of the Society of Artists. The bioscope will play an important part in the exhibition, for not only will the usual entertainments be given, when exclusive films will be shown, but additional moving pictures, illustrative of the various processes of manufacturing in different factories in the Union, will be thrown on the screen. These

are being prepared at enormous expense, and will not only show the details of manufacture, which are of absorbing interest, but will serve as a means of interpreting the economic value of the factories of the Union. These various entertainments will be augmented by military bands, concert parties, and all the other attractions incident to an exhibition. That the affair will be a success is assured. Much influential support is promised, and manufacturers throughout the Union are urged to make an effort to secure a stand and make as fine a display as possible. The event will take place in the middle of the Cape season, when visitors from all parts of the country flock to the Peninsula. These will be considerably added to by reason of the fact that special fares will be available both by boat and rail during the term of the exhibition.

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**A Lecture on Orange Growing.**

On the 22nd October, Mr. R. A. Davis, Chief of the Horticultural Division, delivered a lecture in Johannesburg on the growing of citrus fruits. The lecture was given under the auspices of the Witwatersrand Agricultural Society and the Transvaal Horticultural Society, and there was a good attendance. Mr. Davis made a brief survey of his subject, dealing successively with the types and varieties of trees to grow, the choice of stocks, climatic and soil requirements, and culture. Speaking of the question of suitable climate brought the lecturer to a consideration of the subject of dry-farming in its application to the growing of citrus fruits. There is a tendency amongst citrus growers to rely too exclusively upon cultural methods in lieu of irrigation, and accordingly Mr. Davis took advantage of the opportunity to point out that, however excellent the principles that underlay the dry-farming system so far as other branches of farming were concerned, it was a mistake for orchardists to hope for fair results by any system of cultivation that did not include the artificial application of water. This was true, at any rate, in regard of the Transvaal, where in the orange districts the rainfall was often less than twenty inches per annum. When they considered that a well-grown orange contained about a quarter of a pint of juice, and when they calculated the number of oranges yielded by a mature tree and the number of trees comprised in an acre, the large quantity of moisture absorbed during the season by a citrus orchard would be realized; and when to this drain upon the soil was added the transpiration of moisture through the leaves that went on steadily month after month through the growing season, it was apparent that, in districts enjoying but a limited rainfall, such as in the Transvaal, recourse to irrigation was necessary.

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Referring to the commercial aspect of the industry, Mr. Davis said South Africa was growing more oranges than could be consumed locally. Fortunately, however, an orange export industry had been started. The export of citrus fruits dated from 1907, when the first consignment was sent from the Transvaal. In that year 3000 boxes were exported; in 1911 15,000; and in the season which had just ended 40,000 boxes, mostly oranges. If they continued as they were doing, they would build up one of the largest industries South Africa

had known. He had wondered why no one had acquired a large tract of land and cut it up into small lots for orange growing. The profit derivable from orange growing depended more on the man than on the tree. If he conducted his orchard in a business-like manner, he would make lots of money. He knew a man near Pretoria who made £240 per acre per annum out of his oranges. Another farmer at the Cape made £125 per acre; and a firm at the coast made £3 per tree per annum. The finest citrus trees he had seen in his life were at Barberton, where a man, who went about the work in a business-like way, made 35s. out of each orange tree and £3 out of his naartje trees at five years old. Citrus growers will be interested to know that Mr. Davis is at present preparing an article on the growing of citrus fruits, which will shortly appear in these pages. The article will thereafter be printed in pamphlet form.

**Plague of Flies.**

Mr. Frank Chambers, M.R.C.V.S., Acting Chief Veterinary Surgeon for Northern Rhodesia, writes:—"The article by Mr. Fuller in the June number of the *Union Agricultural Journal* was of great interest to me, inasmuch as at one time I was frequently in the neighbourhood of the Big Umgazi River, where the flies mentioned in Mr. Fuller's article were obtained. During my stay there I never saw a single species of the *Stomoxys*, and the only blood-sucking fly that was caught was *Hippobosca rufipes;* these flies were fairly common. I did, however, catch two specimens of *Tabanidea*, these being particularly troublesome on one day only in the Ngqueleni District. In Northern Rhodesia one can find almost every species of blood-sucking fly. *Stomoxys calcotrans* is very prevalent around Livingstone, and the majority of the dogs possess raw places on their ears due to the attentions of the flies and the subsequent scratching. I am inclined to think that the *Stomoxys* lays its eggs in horse dung, for one always finds the fly more prevalent where horses are kept. Old residents tell that biting flies have been more numerous this last summer than for many years. One finds different species of biting flies in belts, like the tsetse fly, only the belts are not so defined. In one place one will find *Haematopota* extremely thick, and a few miles further on the *Haematopota* will disappear and vast numbers of *Tabanidae* will be buzzing around. Biting flies are to us a source of danger, for we have proof that in some districts *Trypanosomiasis* is conveyed mechanically from 'fly-struck' cattle to healthy ones that are kraalled with them." In connection with this communication it should be recorded that, from information in the possession of the Division of Entomology, the fly plagues which occurred at points along our eastern seaboard in April and May last did, as then anticipated, speedily abate. There is also every reason to believe that the outbreaks were not accompanied by any marked epidemic of disease which could be legitimately charged against *Stomoxys calcitrans.*

**Preparing Wool for Market.**

Mr. R. B. Pickles, Sheep and Wool Expert at the Ermelo Stud Sheep Farm, writes:—The farmer who keeps his few hundred sheep is in no way exempt from the necessity of paying proper attention to the get-up of his

wool. As a matter of fact, he suffers a greater loss in proportion to the larger sheep owner through negligence in packing his wool for market, because it is well known that, even if carefully got up, farmers' lots being small do not realize the same price as larger lots of the same quality, and, if badly got up, would most likely be purchased by speculators who expect to sell again at a profit. Despite these facts, many farmers' lots are sent to market in a deplorable state, with the inevitable result, namely, loss of money to the growers. This condition of things is to be regretted, and it seems most strange to the woolmen that farmers who pride themselves on the good sheep they possess, and the great amount of care and attention given to them, very often fall into the fatal error of bundling all their wool together. For instance, it is not reasonable to suppose that anything like best results can be realized when a lot of wool is sent for sale, bundled all together—fleece, skirts, bellies, locks, and stains; or again when, through lack of care, the wool has got mixed with dirt, chaff, etc., or the bales are too loosely packed—in short, when it is apparent that no care has been taken over the get-up. But without discussing the matter further, the following suggestions, if acted upon, will accomplish all that is required of the small farmer.

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The shearing must be done on a clean floor or board, as the practice of carrying out this work in a dirty shed or kraal is very objectionable, for by such practice the wool gets mixed with all the dirt lying about, and it is of the utmost importance favourably to impress buyers. All fleeces should be skirted regularly, not necessarily deeply: only the dirty edges need be taken off. The fleeces should be then rolled neatly, and this is accomplished by taking hold of the fleece on the far side of the table and bringing same about one-third of the distance across, exposing, of course, the flesh side, with a second turn which should leave the fleece in a position for rolling; the fleece should then be rolled neatly from breech to shoulder. Fleeces must never be tied with string, as the fibre of the string is apt to become mixed with the wool, which is very objectionable to the manufacturer. The number of the sorts into which the fleece should be divided consists of: "AA" or first fleeces, a sound wool consisting of all the lightest, brightest, broadest staple, and the most attractive fleeces; "A" or second fleeces, consisting of all the fleeces that are heavy in condition, with more yoke or earth, and which are fuller, shorter, and less attractive looking than the first. Any extra heavy or discoloured fleeces are to be broken up and to be put in with the skirting or pieces. *Pieces:* It is advisable to remove the stains from the pieces, and, besides, if the stains are left in there is no doubt they will materially damage the other wool, for when the wool is pressed the stains will be squeezed into and stain otherwise clean wool. *Bellies:* These should be kept separately and the "pizzle" pieces taken out and dried. *Stained wool:* Keep out all stains, which should be dried and packed along with the "pizzle" pieces out of the rams' and hamels' bellies. *Locks:* The locks from the shearing board and those under the table after the large dags have been taken out, should be packed together. It is well to pack bellies, locks, and stains separately, even if they have to be packed in bags, for mixed lots seldom bring their full value. On no account must ram's wool be packed with other fleeces; it must be packed separately.

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The bale should be branded legibly with the name of the owner or farm, as insufficient branding often leads to trouble; and they should be

numbered consecutively from the first to the last of the clip. It is of the utmost importance that bales should be of even weight, and in order to secure this the farmer should from time to time weigh a number of the fleeces so that, after ascertaining their weight, he will be able to calculate the number required to make up the proper weight of the bale. And in packing bellies and pieces he should weigh a basketful, and from that calculate the number of baskets for a bale. A good average weight for a bale is about 364 lb. In order to secure legibility in branding, a good ink must be used, as trouble is often caused through the brands becoming indistinct. In concluding, it must be understood that in order to prevent mistakes, the name of the owner or farm and the number of the bale must be plainly marked.

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**New Breeds of Poultry.**

We recently had the pleasure of a visit from Mr. Geo. Bustin, of Rietfontein, Pretoria, whose hobby for many years past has been the study of poultry and their diseases, and who has done a good deal of work in connection with the production of new breeds. The particular object of Mr. Bustin's visit was to introduce us to certain new breeds which he has after a great deal of study succeeded in evolving. These he has named "Bustin's Black Pretors." We learn that the origin of these breeds was the outcome of a determination to out-breed "liver disease," which is so prevalent among poultry in South Africa, especially amongst the heavier varieties. Each year the most healthy specimens were picked out of two distinct varieties and cross-bred. Their progeny was again mated to another variety, and this procedure carefully followed. The result was that each year there was an improvement in vigour, and the birds were constitutionally sounder. "Before doing this," Mr. Bustin explained, "I was convinced that the South African climate is second to none in the rearing of poultry, and that most of the imported fowls are too much inbred for show purposes, utility being sacrificed to appearance. Seeing that no one was making any attempt to produce a South African fowl I decided to embark upon this work, unaided by any outside help or advice; and I can now claim to have produced two distinct varieties of fowl which can exist in any climate in Africa, and which, further, can be fed upon the staple food of the country—maize (preferably broken). Of course," Mr. Bustin continued, "other grains can be given also. Why I mention maize is that every poultry writer decries its use, without knowing why, as they have not taken the trouble to experiment."

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We reproduce here some photos of Mr. Bustin's new fowls. The single-comb variety is a large bird, greeny-black in appearance, with dark feet, black eyes, white ear-lobes, red comb, upright carriage, and broad-chested. They are, Mr. Bustin tells us, fine layers of large (almost round) brown or tinted eggs. For several years he has got from 178 to 200 eggs per hen in twelve months, and as he only hatches from the best layers each season he expects to produce better layers each year. The birds are very active foragers. Although Mr. Bustin introduced, among others, two sitting varieties in the production of this breed, they have so far (for the past two years, since breeding true) proved false to some of their ancestors—none having become

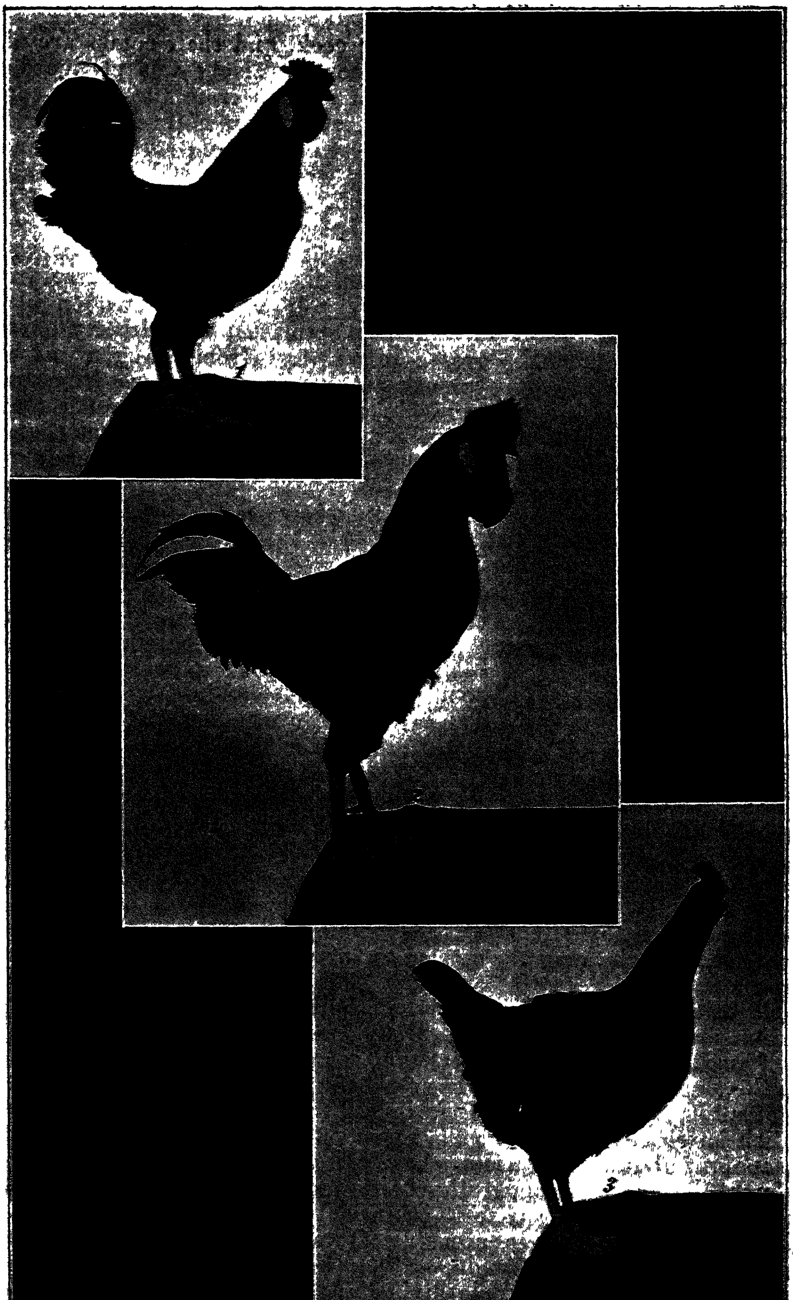

*Plate No. LXIX.* "BUSTIN'S BLACK PRETORS."

Fig. 1.—Cock, Rose-comb Variety. Fig. 2.—Cock, Single Comb Variety.
Fig. 3.—Hen, Single Comb Variety.

broody. The hen is smaller than the cock, and their combs are also much smaller. The second, or rose-comb, variety was produced as the result of a freak, the outcome of a cross from the single-comb variety. This freak Mr. Bustin took advantage of and evolved the rose-comb variety, which proved to breed true from its third year of mating. This variety lays a good-sized white egg, is black, with dark legs, black eyes, white lobes, rose comb, and is about the size of the American White Leghorn. The birds lay on an average 190 eggs per annum, but they will improve in this direction each year. Mr. Bustin informs us that both these breeds are absolutely free from disease of a tuberculous nature. They have been reared on plain grain, green food (no green bone or hot mash), with liberty on the open veld. Their houses are, however, free from draught and are clean, and the birds have plenty of exercise. Chickens from both these varieties mature very quickly and lay at the age of eight and six and a half months respectively. Mr. Bustin informed us that he has another breed evolving, but he could not say much about it yet, as this is only its third season.

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**The Anti-malarial Campaign.**

We have before us a copy of the report for the fifteen months ended 30th June last of the executive committee of the South African Anti-malarial Association, which constitutes an interesting account of recent work of this useful body. Reports received by the association go to show that malaria was more than usually severe during the period under review, especially in the Northern Transvaal; and, in view of the comparatively small rainfall experienced during the season, it is difficult to account for this increase, except on the theory, suggested by one of the medical members on the Council, of a "flock migration" of anopheline mosquitoes. A noteworthy feature has been the peculiarity of distribution, some places having entirely escaped, whilst in others almost every one has been incapacitated. Again, it is reported that cases of malaria have been found on the mountains overlooking the low veld, at altitudes higher than former experience has led one to expect to find them. These circumstances combine to show the need for systematic investigation as to the distribution and movements of mosquitoes. An encouraging feature is to be found, however, in the fact that whenever the precautions urged by the association have been observed the disease has been successfully kept at bay. It is gratifying, indeed, to note that, from inquiries which have been made as to the result of the association's educational campaign, abundant testimony has been received as to its having had a great influence amongst the better educated section of the community. At the same time it is evident that the public is not fully alive to the advantages accruing from the adoption of scientific measures in combating malaria; yet, notwithstanding the apparent disinclination of the people living in malarious districts to form branches of the association—which, it is believed, is due to the fear of branding their districts as unhealthy—the association has, at the request of the magistrates and other officials as well as private individuals, forwarded supplies of literature to many districts for local distribution.

**Mosquitoes and "Millions."**

It will be remembered that the Anti-malarial Association was instrumental in importing a consignment of the West Indian larvae-eating fish, known as "Millions," with a view to acclimatizing them and introducing them to South African waters, these fish having the reputation of being omnivorous devourers of mosquito larvae. The fish duly arrived, and, considering their long journey, in excellent condition. They were distributed in three lots to the Government Fish Hatcheries at Stellenbosch, to the Transvaal Trout Acclimatization's Hatcheries at Potchefstroom, and to the Pongola Rubber Estate Company's property in Zululand, the idea being to try them in a diversity of climates. To the committee's great regret the fish consigned to Potchefstroom and Zululand, after appearing to do well for a short space of time, ultimately disappeared, and this was attributed to their having been devoured by natural enemies. The committee is, however, pleased to report that the fish consigned to the Stellenbosch Hatcheries have made excellent progress. In his latest report, dated 24th July (midwinter), Mr. Chaplin, the Curator of the Stellenbosch Hatcheries, states that from the few female fish originally received he was able to rear about a thousand young fish. He noticed that they commenced to breed as soon as the weather got warm and the water was over 65° F. at midday. They grew very fast when turned out into the open ponds, and multiplied rapidly. As the colder weather set in, however, and the temperature of the water fell below about 55° F. the cold began to affect them, and those turned out into the open ponds died after the cold rains set in. In anticipation of this he had kept a good number of the fish under cover before the cold set in, and at the time of writing he still had over 200 fish of all ages, which were very healthy and still breeding. He was most hopeful of being able to distribute small lots of the fish during the coming season to suitable places. Referring to the larvae-eating habits of the fish the Curator proceeded to say: "There is not the least doubt that they are large destroyers of all kinds of insect life that lives or breeds in water, as the ponds that I kept these fish in during the summer was quite free from all forms of life that I could see with a microscope, although the water suplying the pond, in which the "Millions" were kept, contained large quantities of "Plankton." I was also able to observe how they devoured the larvae of gnats which I collected and fed them on from time to time."

The above-mentioned report, whilst inconclusive as to the ability of the fish to withstand the South African climate in the winter, is nevertheless encouraging, as the waters to which it is intended to distribute the fish are situated in warmer climates than that of Stellenbosch.

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**Export of Plants to U.S.A.**

It is notified that the Plant Quarantine Act of the United States provides that all nursery stock, as defined below, may only be imported into that country if accompanied by a certificate showing that it has been inspected in the country of its origin by a duly authorized official and found to be free from injurious plant diseases and insect pests. Arrangements for securing such certificates should be made with the Chief, Division of Entomology, Department of Agriculture, Pretoria.

The term "nursery stock," as defined by regulation 2 of the United States Plant Quarantine Act, includes "all field-grown florists' stock, trees, shrubs, vines, cuttings, grafts, scions, buds, fruit, pits, and other seeds of fruit and ornamental trees and shrubs, and other plants and plant products for propagation, except field, vegetable, and flower seeds, bedding plants, and other herbaceous plants, bulbs, and roots. The following classes of plants are included in nursery stock as defined above:—Fruit trees, fruit tree stocks, nut trees, grape vines, bush fruits, roses, rose stocks, forest and ornamental trees and shrubs (both deciduous and evergreen), field-grown florists' stock, cuttings, scions or seedlings, fruit pits and other seeds of fruit and ornamental trees or shrubs, and other plants and plant products for propagation not otherwise listed, except as noted above. All woody plants and parts thereof for propagation or planting are included within the term 'nursery stock.' 'Field-grown florists' stock' is all florists' stock which is usually grown outside of greenhouses for all or part of the year. 'Herbaceous plants' are plants which perish annually down to (sometimes including) the root; that is, soft, succulent plants."

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**Drabok.**

This weed, which is better known outside of South Africa as "Darnel," is found in nearly all grain growing countries. It is an annual grass closely allied to the rye grasses, which in its earlier stages of growth fairly nearly resembles the grain amongst which it grows. On this account it is extremely difficult to eradicate it from grain fields by pulling it up, even if sufficient labour were available, which is rarely the case on grain farms. It usually ripens its seed just a little earlier than the grain does, and in thrashing a good deal of the seed is delivered from the machine along with the grain. Drabok seeds often possess poisonous properties, and if wheat containing a large number of them be made into flour, bread made from such flour may produce poisonous effects, such as headaches, drowsiness, etc. Oats containing these seeds in large numbers may be poisonous to stock, although such oats are often fed to animals without any bad effects being noticeable. Consequently, buyers strongly object to the presence of Drabok seed in samples of grain, and its presence has the result of lowering the price of grain to a serious extent; especially when the grain is being sold for export. A good quantity of oats is, in some seasons, exported from the western districts of the Cape Province to Australia, and loud complaints have come from there regarding the very high percentage of Drabok in Cape oats. It would appear that this weed is spreading in our grain growing districts. The Government Grain Grader, Capetown Docks, reports that it is now prevalent in districts, which, only a few years ago, were free from it. According to tests made by him, Drabok seed is, by far, the most common impurity in samples of oats from all over the western districts of the Cape Province, as well as the most harmful.

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He has had a large number of samples of oats from these districts examined, and has found that they contain on the average about 4 per cent. of Drabok seed, which is very much higher than the percentage usually found in oats from other countries. It has already been stated that it is practically impossible to eradicate it from grain lands by

pulling it up when growing, but, fortunately there is an easier way of dealing with it. Being an annual, it grows only from seed, therefore if clean grain be used for seed, there will be little or no Drabok in the crop unless the seed has been dropped on the land from a previous crop. This dropping of seed at harvest would not appear to take place to any very large extent when the crop is cut for oat-hay before it is fully ripe, but when the oats are allowed to stand to ripen fully for seed a considerable number of Drabok seeds are liable to fall on the land during reaping. The easiest way to deal with it, therefore, is to prevent it seeding on the fallow lands and to clean all seed grain before sowing. Tests made at Elsenburg and also independent tests made by Messrs. C. Starke & Co., of Mowbray, prove that this is not only possible but fairly easy. The Elsenburg tests were made with an ordinary "Corbett's" winnowing machine such as can be bought for from £10 to £15, and the cost in labour is only a few pence per bag. It has been the practice at Elsenburg for a number of years to clean all seed grain by passing it through a winnowing machine before sowing. Last year tests were made of Elsenburg oats as they left the thrashing machine, and it was found that the number of Drabok seeds present was under 1 per cent. By passing these oats through the winnowing machine the percentage was further reduced to 0.2 per cent., a percentage which is scarcely noticeable in a sample of grain. This proves:—(1) That if all seed were cleaned before sowing the amount of Drabok in our crops would be much reduced. (2) That it is possible to clean grain fairly thoroughly at little expense before sowing or before putting on the market by putting it through a winnowing machine.

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**Florida Grass for Poultry Runs.**

Mr. R. Bourlay, Poultry Expert at the Potchefstroom Experiment Farm, writes:—In further reference to my notes on Florida grass which appeared some months ago, I am sorry to say that in spite of a bi-weekly watering during the winter months it failed to keep green, though with the first appearance of spring weather it immediately commenced to grow, affording the birds a good picking of green food of which they were not slow to take adavntage. However, in spite of the fact that this grass does not afford a supply of green food throughout the winter, there is no doubt that it is of considerable value for planting in poultry runs pending the introduction of some other variety which will give a supply of green food throughout the year, and at the same time be sufficiently soft in texture to make it palatable and suitable for poultry.

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**Chigger Flea in the Transvaal.**

A writer in the *Transvaal Medical Journal* says:—"This pest has lately appeared in the local gaol at Middelburg. It has been already reported in the Transvaal and appears to be spreading. The cases were entirely confined to native prisoners. Forty years ago this flea was introduced into Ambriz, south of the Congo, by a ship from Brazil, and spread with incredible rapidity. It was supposed to have been taken to the region of the Great Lakes by Stanley's expedition, and during the last twenty-five years it has spread south and east, so that

in many parts of tropical Africa it is more common than in South America or the West Indies. It does not appear to have spread everywhere in temperate climates, but is at present endemic in Zanzibar, Mauritius, and in other parts of the east coast of Africa. There is now no doubt that this pest has obtained a footing in South Africa, and will be found in many at present unsuspected places, such as gaols, compounds of mines, etc., in fact, wherever the East Coast boy goes. In addition to being spread by the feet of these natives, the flea will affect any warm-blooded animal, especially rats and fowls, whilst in every country where they occur they are believed to be carried about by pigs, and the styes of these animals harbour great numbers. The parasite has been credited with the conveyance of 'yaws,' but this is probably unfounded." According to the First Report of the Natal Entomologist (1899-1900), this parasite was established in that Province prior to 1897, being brought there from Lourenco Marques. It is extremely probable that the flea has existed for quite a long while in the Transvaal, and specimens from local coal mines are in the collection of the Division of Entomology. While abundant in the cane-fields of the Natal coast between ten and twelve years ago, for a number of years past it has seldom been heard of, its control being due to treatment and the more hygienic homes provided for the Indian labourers.

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**Disinfection of Poultry Runs.**

Experiments have been carried out by Mr. H. H. Aitken on this subject on several farms where poultry were kept under average fair conditions, but where the birds were, nevertheless, troubled more or less during the whole year with fleas, lice, and mites. The method adopted to get rid of these pests was as follows:—Solutions of commercial disinfectants, made up to double the strength recommended for ordinary domestic use, were applied by means of a watering-can—fitted with a fine rose—to the inside of the house, the woodwork and the soil of the runs, and to the dust bath. This operation was performed weekly; no improvement was noticed in the condition of the birds at first, but after a period varying from six weeks to two months from the time of the first application examination of the birds showed that the parasites were greatly reduced in numbers and that the pests gradually disappeared. The stock became healthier, and the egg production, as compared with that of previous years, showed an average increase of 15 per cent. In one case a cottager, who kept records, stated that an expenditure of 2s. on disinfectants had increased his receipts from the eggs from 20s. to 24s. in the year. In one case the process was used at a farm where gapes had caused great trouble in the spring of every year, and last year (1912) the chickens were practically free from it. Weekly disinfection is found to be necessary at first, but once the birds are healthy and the runs and houses clean, the interval may be considerably increased. The frequency of the application should, to some extent, be determined by the climate and the season of the year. A knapsack sprayer or a garden syringe serve the purpose better than a watering-can.—(*Journal of the Board of Agriculture.*)

**Anonymous Letters.**

A correspondent in the Port Shepstone District, signing himself "Beginner," asks for certain information regarding goats, but fails to enclose his name. We have also a letter signed "Oude Boer," without indication as to the identity of the writer. If these two correspondents will send their full names and addresses we shall have pleasure in referring them to the Divisions concerned for reply. We take this opportunity again of impressing upon readers the necessity for enclosing their names and full addresses, even when a nom de plume is used. Many inquirers prefer to write over a nom de plume, and whilst there is no objection whatever to this for the purposes of publication, the name and address of the correspondent must be enclosed, both as an evidence of good faith and to enable the Department to send replies to correspondents by post. The majority of our inquirers are replied to by post, a selection of the correspondence of public interest being then selected for publication in the *Journal.*

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**Ostriches in America.**

In a letter addressed to the Secretary for Agriculture on the 19th June the holder of a Government scholarship, who is at present studying in America, writes as follows:—"At present there are about 10.000 ostriches in the United States, two-thirds of which are in Arizona, about one-third in California, and a few at Jacksonville, Florida, at Hot Springs, Arkansas, and in Texas and Pennsylvania. From most of these States there is absolutely nothing to fear, although the fact remains, unless something unexpectedly happens, that in fifty years or so to come Arizona and California will compete seriously with South Africa on the American feather markets. To come back to the Pennsylvania ostrich farm, about which very few people know anything, one of the remarkable facts about these ostriches is that, though the temperature often goes as low as 20 degrees below zero in the winter, the ostriches do not seem to suffer from the cold at all. These birds seem to thrive very well and are said to be healthy all the year round, notwithstanding the great humidity of the atmosphere and the fact that no artificial heat whatever is supplied during the winter months. The birds are permitted to run out-of-door during the coldest weather. The ostriches have gone through three winters without any casualties as a result.

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The first chick was born last month, but it died. This chick represents a new strain of ostriches, since it was produced by crossing the North and South African birds, which differ in their general characteristics. The parents are still quite young, about three and a half years old. Of the first six eggs laid five were unfertile, which was of course to be expected of the first eggs laid by pullets. On the same farm a second incubator has been set with two dozen eggs; all have been tested and found fertile. It will be interesting to note the results at the end of the month, when they are due to hatch. Ostriches have been kept in northern latitudes in America in the zoological gardens of New York and Philadelphia for many years without ever having reproduced their kind, as far as I know. The

establishment of ostriches in Pennsylvania dates from July, 1910, when Mr. W. H. Hile went to the interior of Africa and returned with six young birds. In the spring of 1911 he went back to Africa and returned with fifty birds, the largest number yet imported in North America at one time. All the birds are doing well. Whether this new industry in the State of Pennsylvania will ever be of any importance can only be conjectured. However, one cannot be very sceptical about it, though superficially it seems promising."

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**The Exposure of Thermometers.**

In reply to a correspondent in Natal, who inquires as to what height a self-registering thermometer should be placed from the ground in order correctly to register the temperature and yield results uniform with those obtained by the various Government stations, the Chief Meteorologist (Mr. Chas. Stewart) writes :—For scientific purposes, and to get the true air temperature, the thermometer must be surrounded by some enclosure, the temperature inside being the same as that of the surrounding air. This condition is, in practice, extremely difficult of attainment, seing that the temperature as shown by a thermometer depends on the difference between the heat absorbed and the heat given out by radiation, and this again depends on the relative difference between the temperature of the thermometer bulb and its surroundings, e.g. walls, houses, ground, etc. An approximation to the ideal condition is attained by enclosing the thermometers in a louvred box (called a Thermometer Shelter or a Stevenson Screen), the bulbs being placed at a height of 4 feet above ground. This box is provided with a double roof, the inner lower portion being several inches lower than the outer, and perforated with a series of holes, whilst the bottom consists of three overlapping boards, the central one being about an inch higher than that on each side. The louvres allow the wind to blow freely through the shelter, but prevent direct solar radiation; the double roof allows of a free circulation of air, and prevents direct radiation from the outer boards, heated directly by the sun's rays, affecting the bulbs of the thermometer; whilst the overlapping boards forming the bottom prevent direct radiation from the heated soil. The screen also prevents the thermometers from losing their heat by direct radiation to the clear sky at night-time, which would cause the temperature recorded to be too low. The ground is usually cooler than the air during night, but the effect of direct ground radiation on a thermometer has been found to be usually inappreciable at a height of 4 feet above the ground, hence the adoption of this standard height. There must be free ventilation, whatever method of protection of the thermometers be adopted, otherwise the air will be stagnant and become heated by contact with the sides which are exposed to the heating effect of the direct rays of the sun.

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It may be gathered from what has been already stated that the reading of the minimum thermometer at 1 foot being lower than that at 2 feet, is what would be expected to occur. As the result of nocturna- radiation from the soil, the land falls to a lower temperature than the air above it, which becomes cooled by actual contact with the cold ground. This effect of nocturnal radiation is occasionally seen in a marked form in the lower leaves of shrubs being nipped by frost, whilst the upper portions are not affected. Such an occurrence is an instance in a small way of what

is known as an "inversion of temperature," which may be briefly explained as follows :—Observations by means of balloons, etc., have shown that on the average the temperature of the air decreases by 1° F. for every 300 feet of ascent, this rate being usually known as the "vertical temperature gradient." Over dry plains or plateaux, however, more particularly if these are situated at any considerable altitude, so that the air is considerably attenuated, on calm, clear winter nights the lower layers of the atmosphere may be cooled by radiation and conduction to such an extent that they are reduced to a temperature considerably below that of air several hundred feet above the ground. The temperature to which the air is then reduced will be lower the less dust there is in the atmosphere. There is thus produced an "inversion of temperature." As the colder air is also denser, it follows that the heaviest air settles on the ground. A state of stable equilibrium therefore prevails, so that the air tends to continue calm throughout the night, until affected by the sun's rays next day. A similar explanation accounts for the comparatively mild temperatures experienced on hills as compared with adjacent valleys, the cooled and consequently heavier air descending from the hill-tops and sides and accumulating in the valleys below, whilst the summit continues to receive uncooled and relatively warm air from above. Thus it may happen that the surrounding valleys are filled with haze or even a sea of fog, causing an overcast sky, whilst the inhabitant of the hill-top experiences mild, dry air, and a cloudless sky. Other processes at times accentuate this difference between the hill and valley stations, but into these it is not necessary to enter here.

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**Books for the Dairy Farmer.**

In our last issue we published a list of general works likely to be of assistance to farmers, and we announced that we proposed publishing from time to time lists referring to special branches of farming. The librarian now furnishes the following list of books suitable for the dairy farmer, including the publisher's name and the price in each case. All these books are obtainable from, or through, the leading South African booksellers, and when ordering any of these works care should be taken to ask for the latest edition:— "Milk, its Nature and Composition," by C. M. Aikman (A. & C. Black, London, 1909: 5s.); "Clean Milk," by S. D. Belcher (Orange Judd Co., New York, 1909: $1); "Practical Dairy Bacteriology," by H. W. Coun (Orange Judd Co., New York: $1.50); "Testing Milk and its Products," by Farrington & Woll (Mendota Book Co., Madison, Wisconsin, U.S.A.: $1); "The Book of the Dairy," by W. Fleischman (Blackie & Sons, 50 Old Bailey, London, E.C.: 17s. 6d.); "Dairy Bacteriology," by Freudenreich (North & Son, Fetter Lane, London: 2s. 6d.); "Leerboek der Zuivelbereiding," door H. B. Hylkema (Van der Velde, R. Leeuwarden, Holland: 15s.); "Dairying in Australasia: Farm and Factory," by M. A. O'Callaghan (T. Maskew Miller & Co., Capetown, 1912: 21s.); "Modern Dairy-Farming," by H. L. Puxley (Upcott, Gill & Co., London, 1912: 5s.); "Questions and Answers on Milk and Milk-Testing," by Publow & Troy (Orange Judd Co., New York, 1911: $1); "Profitable Dairying," by Peck (Orange Judd Co., New York: $1); "Farm Dairying," by Laura Rose (P. Werner & Lane, London: 5s. 6d.); "British Dairying," by Prof. J. P. Sheldon (Crosby Lockwood &

Son, 7 Stationers' Hall Court, Ludgate Hill, London: 2s. 6d.); "Melk en Melk-produkten," door A. A. Ter Haar (P. Noordhoff, Groningen, Holland: 15s.); "Butter-making on the Farm," by Tisdale & Robinson (North & Son, Fetter Lane, London: 1s.); "First Lessons in Dairying," by H. E. van Norman (Orange Judd Co., New York: $1); "The Science and Practice of Cheese-making," by Ch. A. Publow (Orange Judd Co., New York: $2; "Milk and its Products," by H. H. Wing (The Macmillan Co., New York: $1).

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**Miscellaneous Notes.**

Under section *sixteen*, sub-section (2), of the Stock Diseases Act, 1911, the Hon. Minister of Agriculture has ordered the regular dipping of all cattle within the Borough of Ladysmith (Natal) in the three-day dip prescribed by Government Notice No. 1073 of 1912.

Attention is directed to a printer's error which appeared on page 689 of the last issue, in the paragraph referring to the importation of plants. The plants therein mentioned is stated to have been added to the list of plants which may not be introduced into the Union, as from the 1st October, *1913*. The year should have been 1915.

"Some Observations on the Manuring of Mealies, with Experimental Results," is the title of a leaflet from the pen of Mr. A. Gordon Howitt, B.Sc., which has been issued in English and Dutch by the agricultural offices of the Potash Syndicate (Box 1031, Capetown, and Box 9, Durban). After discussing experiments at Cedara and elsewhere, the author proceeds to recommend certain fertilizing mixtures, and concludes with a discussion of the value of potash.

We are informed by the Secretary of the New Hanover Agricultural Association, Natal (Mr. W. D. Stewart), that a meeting of New Hanover farmers was held early in October for the purpose of forming a co-operative insurance association to enable them to insure their horses against loss by death. The preliminary arrangements were made, and it was thought that the association would be in working order by the 1st November. The New Hanover Agricultural Association also held its annual meeting last month, when the president, Mr. G. C. Mackenzie, delivered an encouraging address.

DAIRY COW ESSENTIALS.—In an address to the dairymen at the recent Massachusetts Farmers' Week, Mr. J. E. Dodge, superintendent of the Hood Farms, referred to the three essential points to be considered in the development of a high-class dairy cow. These were: (1) Inherited dairy ability, which is the tendency to milk production rather than the production of beef; (2) constitution, which is the ability to produce large quantities of milk year after year and maintain herself in good health and vigour; and (3) capacity, the ability to consume large quantities of feed and convert it into milk.

REGISTRATION OF FRIESLAND CATTLE.—Owners of Friesland cattle who wish their cattle inspected for registration in the Appendix of the South African Stud Book should communicate at once with Mr. C. McG. Johnston, Acting Secretary of the Friesland Cattle Breeders Association of South Africa, P.O. Box 377, Bloemfontein. It should, however, be noted that the Appendix of the South African Stud Book is intended for pure-bred stock and not for grade stock,

and that it is essential for registration in the Appendix for owners to supply an authentic history of the herd, stating the origin of the cows and the details of the bulls used. Such a history must demonstrate satisfactorily the purity of blood of the animals concerned.

CATTLE-FREE AREAS.—The Hon. Minister of Agriculture has ordered, under paragraph (*a*), section *sixteen*, of the Diseases of Stock Act, 1911, that (*a*) the strip of land in the District of Tsolo along the Elliot and Maclear fence, within the limits of 800 yards from that fence, and (*b*) the strip of land in the District of Engcobo, along the Elliot and Maclear fence, extending from the District Xalanga to the District of Maclear, within the limits of 800 yards from that fence, shall be belts of country from which all horned cattle shall be removed and shall not be allowed to graze thereon, or enter or traverse except under the authority of a permit issued by the resident magistrate of the district or a Government veterinary officer.

LIVE STOCK OF GREAT BRITAIN.—According to returns prepared by the British Board of Agriculture there are in Great Britain (in round numbers) 369,000 Shire horses, 203,000 Clydesdales, and 12,000 Suffolks. Among cattle the Shorthorn breed easily heads the list with over 4,000,000 head, or 64 per cent. of the entire stock of the country; this, moreover, is without including the Lincoln Red Shorthorns or the "Irish" cattle, which would be mostly Shorthorns. Devons come next, followed by Ayrshires, Herefords, and Aberdeen-Angus, in the order specified. As regards sheep, the Scottish Blackface heads the list with 5,500,000; next comes the Cheviot breed with 2,500,000; Welsh follows close, and then come the Lincolns, Hampshires, and Shropshires—to take the leading ones (twenty-nine breeds altogether are enumerated). The pig section is topped by the Large White, with the Berkshire second, and followed by the Middle White, Large Black, and Lincoln. Tamworths are last on the list.

THE REASON FOR SMALL EGGS.—There is a theory held by many that the presence of a small pigeon-sized egg in the nest means that that particular hen has exhausted herself and will not begin again for some time. "That theory," says a writer in the *Canadian Thresherman*, "has been exploded by the aid of the trap nest," and he adds that records kept by him show that on the 17th February a Brahma hen laid a small, pigeon-sized egg; the next day she laid another small egg, but somewhat larger than the one of the day before. Two days later she laid a regular-sized egg, and continued doing so until the 26th of the month, when she laid a double-yolked egg, "which proved that both the pigeon-sized and double-yolked eggs are the product of hens that are too fat. The hen in question was very fat."

AGRICULTURAL PARCEL POST.—The following amendment of sub-sections (1) and (2) of regulation *seventy-six* of the Post Office Regulations (published under Government Notice No. 1468 of the 24th August, 1911) has been approved by His Excellency the Governor-General:—(1) The agricultural parcel post is restricted to the following classes of articles produced within the Union, viz., primary products of the soil, horticultural products, dairy produce, and food-stuffs. Such articles as liquids, beverages, manufactured tobacco, medicines, leather goods, ostrich feathers, wool, mohair, skins, and

mineral and industrial products are not admitted at the rate for agricultural parcels. (2) Every article intended for transmission at the rate for agricultural parcels shall have attached to the cover a declaration in a form similar to that set forth in Schedule 1 to these regulations. (This amendment comes into operation on the 1st November.)

NURSERYMEN TO NOTE.—The first prosecution of a South African nurseryman for an infringement of the provisions of the Agricultural Pests Act occurred during September, when Mr. W. F. Koenig, nurseryman, Johannesburg, was proceeded against at the instance of the Department of Agriculture. It was alleged by the Department that the door of Mr. Koenig's fumigation chamber was of an unsatisfactory nature and required improvement. The defendant claimed that the door was efficient. After taking evidence and inspecting the premises for himself, the magistrate gave judgment for the plaintiff and imposed a fine of £5; this was paid.

In giving judgment the magistrate is reported to have said that he could not conceive a more careless piece of shoddy workmanship than what he had seen in the door under dispute. The defendant had obviously intended to sail just within his rights, under the law, and just as obviously, to him at least, the defendant objected strenuously to any supervision on the part of the Government officials. The magistrate added that the Act provided a severe penalty, but, as this was the first case of the sort, he would be lenient.

# Notes from the Experimental Farms.

## ELSENBURG IN SEPTEMBER.

THE rainfall for the month was 2.02 inches, making a total of 23.64 inches for the first nine months of 1913. In the orchard, tree-planting, spraying, grafting, etc., were continued. Different varieties of the domestic olive were grafted on wild olives, and a large number of olive cuttings were planted out in the nursery. In the Vlei, 12,200 vines, both grafted and ungrafted, were planted out for experimental purposes.

Forty acres of heavy land were sown to maize; and some 40,000 mangel wurzels and 30,000 kale seedlings were planted out. At least 110 acres of cereals were top-dressed with Government guano, nitrate of soda, and superphosphates. Rye promises an excellent yield. The oat crop is fair, as is also the barley. Of wheat a middling crop is expected.

During the month the milk flow was good, due to favourable pastoral conditions. Composite mixed samples were taken of the milk of each cow, and these were tested once a week.

## CEDARA.

A considerable portion of the vice-principal's time has been taken up with extension lectures to farmers' associations. Mid-Illovo, Donnybrook, Harding, Creighton, Umzimkulu, and Pinetown were visited, different lectures being given at different places, viz.: (1) Maize and its improvement; (2) ensilage; (3) artificial manures; and (4) varying physical characters of soils.

The fruit crop, though not so heavy as last year, promises to be very fair. The germination tests of grasses have been continued, and it is hoped to publish the results next month. The sugar-cane on the coast is arrowing freely, but it has been found that, at the most, only two per cent. of the pollen is alive, though a greater percentage may be found to be viable a little later. This accounts for the failure attending endeavours to cross cane in this Province. There is a big demand for spineless cactus from the Winkel Spruit farm. The lots of eucalypti are going in.

A successful sale of stock was held in Maritzburg, when some thirty head of cattle were sold.

## STANDERTON.

Mr. McNae, who has been absent on leave, has reassumed duty.

Mr. McNae brought back with him a valuable Hereford bull and heifer, which have been placed at the Standerton farm.

## ERMELO STOCK SALE.

A successful sale of pure-bred stock was held at the Ermelo Stud Sheep Farm on the 22nd October. A notable feature of the sale was the large demand for Tasmanian sheep, which were in greater request than Wanganellas. Prices for the former ranged from 1½ guineas to 40 guineas, and for the latter from 3 guineas to 20½ guineas; while Wanganella-Rambouillets fetched from 4½ guineas to 12 guineas. Another feature of this sale, so far as the sheep section was concerned, was that very few stud breeders purchased animals, the result being that the stud stock did not realize the prices they should have done.

There was also a remarkable demand for Aberdeen-Angus bulls, for which prices were rather higher than for Fries bulls. Aberdeen-Angus bulls have become popular in the eastern Transvaal through the successful results which have followed their crossing with other cattle, particularly grade Shorthorns. There are parts of South Africa, notably the colder regions of the high veld and along the Drakensberg Range in Natal, where it is likely that this breed will do well. Breeders possessing grade or cross-bred Shorthorns in Natal would probably be well advised to introduce Aberdeen-Angus bulls. The Aberdeen-Angus is an excellent beef breed, and matures early. Animals of this breed do not require as much feeding and attention as Frieslands.

## TWEESPRUIT STOCK SALE.

Another successful sale of stock was held at Tweespruit on the 31st. There was a large gathering of Free State farmers, and a

few from Natal and the Cape Province, but there were not many buyers from the Transvaal. A feature of the sale was what would appear to be a falling off in demand for light horses, e.g. thoroughbreds, and an increasing demand for horses of the heavy draught breeds—such as Oldenburgs and Clydesdales. The bulls sold consisted of animals of the Fries, Red Lincoln, and South Devon breeds. The first mentioned were most in demand, and sold at good average prices, but the Red Lincolns and South Devons did not appear to be quite so popular, nor in such great demand as they were a few years ago. A large consignment of sheep was offered, chiefly from the Grootvlei and Roodepoort farms, and they realized excellent prices. The Wanganella stud rams from Grootvlei in particular were of excellent quality, and many buyers were anxious to acquire them. It would appear that Wanganellas are increasing in favour in the Orange Free State, and that they are more in demand than Tasmanians.

Details of prices and further information in regard to this, as well as of the Ermelo sale, will appear next month.

## LEASE OF GOVERNMENT STALLIONS.

With reference to the notice appearing on page 694 of the October issue, the following further particulars regarding the leasing of Government stallions is published for general information.

| Name of Stallion. | Breed. | Maximum Fee to be charged by Lessee for Service of each Mare. | Name of Lessee. | Address of Lessee. |
|---|---|---|---|---|
| **Hermiston** | Thoroughbred | 50s. | Lease to Mr. J. H. Olivier, sen., of Zastron, cancelled, now leased to Mr. George W. Anderson | Bushmansfontein (Churchill) P.O., Dealesville, Boshof, O.F.S. |
| **Fokus** ... | Oldenburg ... | 40s. | C. G. Oertel ... | Doornplaat, P.O. Immigrant, O.F.S. |
| **Jack No. 2 (Malmesbury)** | Catalonian ... | 45s. | Peter Bergh ... | Malmesbury. |

The thoroughbreds "Candil" and "Little Dick" were sold by public auction at Standerton on the 10th October; and "Dominie II," "The Negus," and "Grand Slam" at the Tweespruit Annual Sale of Stock on the 30th October.

The stallion "Proxy," leased to Mr. J. L. van Heerden, Uitvlucht, Marico, died on the 31st October, the veterinary report in regard to the cause of death being still awaited.

# Correspondence.

This section is set aside for correspondence on all subjects affecting the Farming Industries of the Union of South Africa and cognate matters; and, while every reasonable latitude will be allowed, contributors are requested to be as concise and succinct as possible in the expression of their views.

Suggestions for practical consideration and discussion, and hints as to improved methods applicable to any branch of agriculture, are particularly welcome.

It must at all times be distinctly understood that the Department of Agriculture is in no sense responsible for the views and opinions expressed in this section.

All communications should be clearly addressed "The Editor of the *Agricultural Journal*, Department of Agriculture, Pretoria," and written on one side of the paper only.

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## ECONOMIC VALUE OF CERTAIN BIRDS.

To the Editor of the *Agricultural Journal.*

SIR,—As your valuable journal circulates so largely amongst the farmers and others interested in farming, I think you would be doing a service to the community if you would be good enough to throw open the pages of the *Agricultural Journal* to letters and articles dealing with the value of certain game and other birds, inviting correspondence on the matter. Beyond doubt, many birds are of great value as insect pest destroyers, but I fear the assistance rendered by them to farmers, gardeners, and horticulturists is not properly understood or appreciated, and in such a country as South Africa, with its ants, locusts, and other pests, the matter is, in my opinion, rather a vital one. We continue killing our game and other birds, many of which are getting more and more scarce every year, without giving due regard to the future. It would appear as if this question has recently received some attention in the Orange Free State, as under Proclamation No. 13 of 1913 the several kinds of birds known as paauw and korhaan (including the whole of the bustard species) have been protected for a period of two years. My ornithological knowledge is not sufficient to allow me to weigh the pros and cons properly and take up the cudgels on behalf of any particular species of bird, but my object in writing you this letter is to start the ball rolling, when I hope the question will be seriously taken up by ornithologists, farmers, and others more competent than myself. In a paper on the Plumage Bill, read in June last before the Royal Colonial Institute, Mr. Jas. Buckland stated, *inter alia*:—

"A great increase of insects, and enormous damage by them, invariably follows wholesale destruction of wild bird life. In New Zealand, owing to the blind and wanton slaughter of this primary check on the increase of destructive insects, I have seen countless billions of caterpillars move in a solid mass across cultivated lands, devouring every green thing in their march. Even railway trains were held up by the immensity of the numbers of these crawling atoms, the wheels of the engines being unable to grip the rails owing to the 'mush' of crushed caterpilars. In 1877, the farmers of Nebraska, in the belief that the blackbirds were injuring their wheat, scattered their fields with poisoned grain. A great mortality of birds followed, numbers of other species being destroyed as well as the blackbirds. It required only the warmth of the sun to release from confinement the destructive energies of the innumerable locusts' eggs. The sun came, and there being no birds to eat the young locusts, hardly a field of wheat in Nebraska escaped destruction. In 1895, Mons. J. O. Clercy, Secretary of the Society of Natural Science, Ekaterinburg, Russian Siberia, stated that the ravages of cut-worms and locusts had produced a famine in that region. One of the evident causes which permitted such a numerous propagation of insect pests was, he said, the almost complete destruction of birds, most of which had been killed and sent abroad by wagon loads for women's hats.

"In 1909, the sub-districts of Robertson and Kangaloon, in the Illawarra District of New South Wales, what ten years ago was a waving mass of English cocksfoot and rye-grass was a barren desert, and nine families out of every ten were compelled to leave the district. This was through the grubs having eaten out the grass by the roots. Ploughing proved to be useless, as the grubs eat out the grass just the same. The birds had all been ruthlessly shot in the district, and the absence of bird life was amazing."

Mr. Buckland says he could quote a hundred similar instances showing that the destruction of bird life is invariably followed by disaster to man. The capacity of birds for destroying insects is marvellous. Mr. Buckland pointed out that the period of the growth of leaf and blossom is also the nesting season of the birds, and as most birds eat most of the time then, the quantity of harmful insects consumed is almost incredible. He also stated that titmice have been known to make from forty to sixty trips an hour to the nests with their beaks filled with all kinds of insects. Other birds will consume 10,000 tree lice in a day. Other birds again have been seen to eat thirty-five gipsy moths a minute for eighteen minutes at a time, while thirty grasshoppers and two hundred and fifty caterpillars have been found in the crop of a single cuckoo.—Yours, etc.,

H. SOTHCOTT.

Johannesburg.

[This subject is of considerable importance to farmers, and we invite correspondence. The personal experience of observers, such as farmers, would be valuable.—Acting Editor, *Agricultural Journal.*]

## CITRUS GROWING ON THE MAGALIESBERG.

To the Editor of the *Agricultural Journal.*

SIR,—*Re* "A Citrus Interview" which appeared in the August issue of the *Agricultural Journal* in the Editorial Notes. It is obvious that the gentleman interviewed is optimistic as to the citrus possibilities of the northern slopes of the Magaliesberg. As the *Journal* is an official publication, and is read in countries outside South Africa, California amongst them, it is hardly fair that Mr. Jonnes' views, being those of an enthusiast, should go unchecked.

There are two statements which require qualification in some way. Mr. Jonnes says that, whereas lands planted to citrus in California have been sold at prices up to £1000 per morgen and over, here they can be got for £8 to £10, and with fountain water. As the cost of budded orange trees, bought by the 100, is from 2s. to 3s. 6d. each, this statement can hardly be taken as correct.

A little further on Mr. Jonnes talks of a profit to the grower of 300 or 400 per cent. after all charges are paid. No doubt Mr. Jonnes will modify his views during the next five or six years, but meanwhile men in other walks of life and in other countries may be tempted to throw up their occupations and seek their fortunes growing oranges on the Magaliesberg.

I am quite aware, after ten years' citrus experience in this district, that the prospects of the conscientious and up-to-date planter are excellent, provided that he plants the best types of good commercial varieties and does not plant more trees than his water supply will support when the trees are in full bearing, but that suitable land with adequate water for irrigation purposes and within a reasonable distance of a railway can be purchased at anything near the prices mentioned by Mr. Jonnes, I do not believe. It is certainly the case that a purchaser can acquire farms of 3000 morgen, at, possibly £1 per morgen, but when the water is measured it will probably be found that there is only sufficient water to maintain in health, say, five or ten acres of bearing citrus trees. The remaining 2990 odd acres are, from a citrus grower's point of view, not worth a penny a square mile. If the prices which have been paid for citrus farms during the last eight years or so in this district by men who consider that they have made fair bargains are worked down as suggested above to the acreage they will eventually be able to hold in vigorous bearing—say, when their trees are twelve or fifteen years old—it will probably be found that they have paid a very fair, if not a very high price for their orchards.

In conclusion, might I suggest that the Government Horticulturist or an experienced officer of the Irrigation Department be asked to write an article on the water requirements of citrus trees. There is a tendency to believe that a bearing orange tree can thrive and produce excellent and profitable crops on a very small supply of water. This belief is certain to lead to grave losses to planters and may eventually result in a serious set back to the industry in South Africa.—Yours, etc.,

E.

Rustenburg.

## VELD DEFICIENT IN PHOSPHATES.

To the Editor of the *Agricultural Journal.*

SIR,—My farm Truro Park, and practically all farms in the District of Maclear, are very deficient in lime. The veld is sour, and all stock suffer in consequence. Cattle wander over the veld in search of old bones and fight each other for these luxuries. The Barkly East farmer (should he allow his sheep to remain beyond two months on the sour veld) has bandy-legged lambs to climb the Drakensberg. Our fowls lay eggs without shells, and I believe even locusts have a knowing dread of that part. Will you please advise me as to what course to adopt in order to remedy this deficiency in regard to live stock, more especially cattle and sheep, with a view to good healthy bone development, and to curing bone hunger?—Yours, etc.,

E. VINCENT COTTERELL.

Brabant Lodge, East London.

[The Principal, Grootfontein School of Agriculture (Mr. R. W. Thornton), replied: — It is quite evident from your letter that the animals in your part of the country are greatly in want of phosphates, and for this reason the veld as it stands at present is highly unsuitable for the raising of young stock. The very fact that the cattle, as you say, wander over the veld in search of old bones shows the craving they have for this material, and I would strongly advise you to feed heavily with bonemeal. Of course, the only permanent way of correcting the trouble is by fertilizing heavily with phosphatic fertilizers, and all exotic grasses and other fodders that are laid down should be well manured with this fertilizer, and the fodder will then give these animals what they desire to prevent the condition of osteo-malacia as described by you. With the veld as it is at present stock should only be grazed for a short time, until such time as the trouble can be corrected and plenty of bonemeal should be used.]

## VELD BURNING.

To the Editor of the *Agricultural Journal.*

SIR,—In the September issue of the *Agricultural Journal* you invite correspondence on the vexed question of grass burning. As one who must take the opposite view of those who are opposed to the practice of burning the grass I seem to see the shrugs of contempt and hear the expression of "What a d—— fool" from those of your readers and probably some of the scientists who do not see eye to eye with one who has had an experience of more than half a century. The thought of those expressions of contempt makes one somewhat shy to face the subject, although you kindly ask for opinions from both sides.

I have been a farmer for over fifty years in what is known as purely grass veld, and having had the management of the veld all that time I have found from my own personal experience that burning the grass does not injure it in any way. The farm I am on now has been regularly burned ever since it has been a farm—probably ever since the 1870 settlers came here—and as far as I can see the feeding value of the grass has rather improved instead of deteriorating. Grass burning, like every other work on the farm, requires to be done intelligently and at the right times of the year. My farm and several others

in this neighbourhood are worked as follows: They have been well fenced, cut into several paddocks, and these are rested and burned regularly, as required; the right times for burning here are in August and February. After burning a portion or whole of a camp it is rested until the grass is well up, then the sheep are turned on to it. Should any deaths occur they are dosed with Cooper's dip and salt, nine parts salt to one of Cooper's dip, a teaspoonful to each sheep. After the sheep have well eaten out the grass the camp is rested for a time, the sheep are again brought in, after which it is again rested, and is then found to be safe for cattle. As a "brand" for young lambs we burn in February, the ewes being due to lamb in April and May, my experience being that a good "brand" is more valuable than a field of oats or any other artificial feeding, although the latter should always be ready in case of drought.

As to the erosion of the veld, I have found that overstocking is entirely to blame. Overstocking the veld means the gradual tramping out of the best grasses, an endless number of footpaths which mean dongas in time, and an enormous increase of useless weeds, especially what is known as inkanga. I have certainly never known sweet grass to take the place of sour grass, with the exception of couch grass; this generally covers bare spots here.

We have been told that we ought to reap the grass and save it for hay; this would be a splendid idea if it were possible to carry it out, but how is a man to reap amongst boulders and stones which cover most of our veld? I am entirely in favour of reaping patches of good grass, as it makes splendid feeding for winter use, but for the whole farm only burning is the practical solution of the difficulty.

In conclusion, my advice to every owner of a good farm is to put a real jackal-proof fence round it, put in as many paddocks as possible, work and rest them alternately, burn off all old grass at the right time, work on intelligent lines, and the result will be satisfactory in spite of what the opponents of grass burning have to say about it.—Yours, etc.,

J. C. RIPPON.

Highlands, Cape Province.

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To the Editor of the *Agricultural Journal.*

SIR,—One would think that if veld burning tends to kill the fine sweet grasses that they would have all disappeared long ago, as ever since South Africa was inhabited by native races able to produce fire, which I suppose must have been the case for hundreds of years, the veld was sure to have been burnt off every winter, as of course the grass would have been a great deal longer than it is now, and a single fire would have spread over an immense area.—Yours, etc.,

FERGUS RENNIE.

Kokstad.

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## RINGWORM, WARTS, AND TICKS.

To the Editor of the *Agricultural Journal.*

SIR,—I have read your valuable journal and seen the good advice given to farmers, and I also would like to ask your advice. (1) My calves born late usually get circular spots. In the beginning these are as big as a threepenny bit and gradually get bigger like a ringworm. Sometimes the whole head of the calf is covered. What must I apply?

(2) My calves at the age of one to two years get warts on the head. Some are an inch long and others an inch and a half, and three inches broad. What must I use for that?

(3) What must I use for my horses, which become covered with ticks? I thought of spraying them; what material should I use? You must understand they are big and untamed, and usually run the mountainous veld.—Yours, etc.,

L. P. J. FOURIE.

Heilbron, P.O. Philippolis.

[The Senior Veterinary Surgeon, Bloemfontein (Mr. Brierly), replied:—(1) The circular spots described are no doubt ringworm and should be treated

as follows: Soften the crusts with warm water and soap and then scrape them off with a blunt knife. Then paint the raw surface left with tincture of iodine. The scrapings of the crusts should be burned. The calf-house, wooden posts in the kraals, etc., where the calves rub themselves, should be disinfected with carbolic solution, 1-40. (2) *Warts on calves.*—The easiest way to remove these when not very large is by tying a cord tightly round the base. If one tying is not sufficient to remove them, a second can be applied in a few days. If they are not of a suitable shape to tie apply a little acetic or nitric acid and repeat as required utnil the wart is dead. A preliminary washing with solution of Little's or Jeyes' fluid before operation on both ringworm and warts is advisable. (3) Ticks on horses should be treated similarly to cattle, that is by dipping or spraying with arsenical dip. Cooper's cattle dip answers the purpose if it is not convenient to make up a dip with arsenite of soda.]

## KAPOK.

To the Editor of the *Agricultural Journal.*

SIR,—Can any one give particulars regarding the kapok tree (*Eriophoris javana* R., *Bomban pentadrum*, L., *Erodendron enfructuosum*, D.C., a Javanese cotton tree I see eulogized in a French Review, *L'Oceanie francaise?* Being a tropical plant, I should like to have it tried in Zoutpansberg, but perhaps some one has already had some acclimatizing experiments with it.—Yours, etc.,

H. M.

P.O. Louis Trichardt.

[The Chief of Tobacco and Cotton Division (Mr. W. H. Scherffius) replied: Two or three of these trees are growing at present in the Zoutpansberg District on the Tzaneen Estate. The trees at present are about 20 feet high and some 6 or 8 inches in diameter near the base. These trees produce a crop of fruit annually. I must state, however, that the pods are very sparsely scattered over the trees and give a low yield of lint compared to the size of the trees. The lint from kapok, mostly shipped from India, sells in this country for, I believe, about 8d. per lb., and I would judge from the yield on the two or three trees we have at Tzaneen that it would not be a paying proposition unless a much heavier yield was obtained.]

## BLOEDPENS.

To the Editor of the *Agricultural Journal.*

SIR,—Kindly inform me whether a lamb is born with bloedpens and what remedies must be used.—Yours, etc.,

J. H. VILJOEN.

P.O. Schweizer Reneke.

[The Assistant Principal Veterinary Surgeon (Mr. J. D. Borthwick) replied:—This disease is still being investigated by the Veterinary Research Department, but so far as known at present the disease is caused by some infective organism which enters the system of the young animal through the navel cord, either during or immediately after birth. The treatment is purely preventive. All infected lambs should be at once removed from the flock and kept apart from other ewes which are about to lamb. When this disease breaks out the flock should be moved to clean veld and new kraals. On no account should the same kraal be used. It is necessary sometimes to move the flock several times. All lambs born after the disease has once made its appearance should have their navel cleaned and disinfected, and, when dry, painted over with tincture of iodine as soon after birth as possible. A curative treatment which sometimes proves successful is to take a handful of coarse salt and dissolve it in a large bottleful of water, the dose being a tablespoonful. Preventive treatment, however, is what you must rely upon, as, if the disease is allowed to continue, the veld becomes so badly infested that it becomes next to impossible to rear any lambs.]

## BLOOD CLOTS ON COW'S TEAT.

To the Editor of the *Agricultural Journal.*

SIR,—I would be glad of your assistance in the following matter: I have a cow about two months in calf, and for the last few days from one teat clots of blood in milking her are drawn. Will you advise as to cause and best remedy? The cow in question has been in milk eight months.—Yours, etc.,

I. W.

Krugersdorp.

[The Senior Veterinary Surgeon, Transvaal (Mr. J. M. Christy), replied:—I suggest you foment the affected quarter for half an hour twice a day and draw off the milk from it three or four times a day. After each fomenting massage the affected quarter and rub in a little of an ointment composed of one ounce each of extract of belladonna and Venice turpentine and eight ounces of vaseline.]

## YIELDS OF PASTURE GRASS IN ORANGE FREE STATE.

To the Editor of the *Agricultural Journal.*

SIR,—With a view to emphasizing the urgent necessity of artificial feeding of all stock, especially during winter and periods of drought, when pasture grass is withered and dry, I have for some time past been collecting some useful and interesting data in this Province regarding the actual yield per acre of pasture-dried grass.

From a selected patch of about five square feet the dry grass cut to the roots is carefully collected and weighed, and the content per acre is calculated. Some two hundred and fifty patches have thus been treated in nearly every part of the Province, representing nearly all qualities, sweet, sour, coarse, vlei, etc., with following results:—

| | | | | |
|---|---|---|---|---|
| 42 | samples | average | 4068 lb. | per acre. |
| 40 | ,, | ,, | 3354 lb. | ,, |
| 43 | ,, | ,, | 2692 lb. | ,, |
| 41 | ,, | ,, | 1116 lb. | ,, |
| 42 | ,, | ,, | 402 lb. | ,, |
| 42 | ,, | ,, | 68 lb. | ,, |

Grand average, 1945 lb. per acre. The highest yield included in the above is 5896 lb. per acre, and the lowest 16 lb. 6 oz. per acre. These figures, however, do not represent the highest and lowest yields obtained in isolated instances, as a patch in a southern district was calculated to contain only 2 lb. 11 oz. to the acre, whilst a large vlei on the farm Riverside, near Kopjes, returned just over 5 tons to the acre. As these are isolated instances the figures are not included in the above averages.

According to the last census the Free State, on 7th May, 1911, possesses—

| | | |
|---|---|---|
| 1,524,512 | head of | cattle, horses, mules, etc.; |
| 9,636,209 | ,, | small stock, sheep, and goats; |
| 9,097 | ,, | ostriches. |

We will suppose the latter require no grazing on dried pastures, so are not included in the calculations. If to the above we add the low amount of 20 per cent. for increase since the 7th May, 1911, we have to-day 1,829,414 head of big stock and 11,563,450 head of small stock.

It is generally assumed that, on an average, big stock require and eat about 30 lb. dried grass each per day and small stock about 3 lb. each per day. On this basis, about 5¾ acres are required per year for each head of big stock and about 1 acre per year for each head of small stock, but taking into consideration all the qualities of the grass and the actual average grass content per acre as above mentioned, it is safe to assert we require about 7½ acres per year for each head of big stock and about 1½ acre per year for each head of small stock, or a total of 31,065,780 acres.

The Orange Free State has a total area of about 32,248,960 acres; deducting from this one-tenth for towns, villages and reser·es, rivers, sluits and

dams, homesteads, kraals, kaffir huts, and surroundings, lands, gardens, plantations, railway, etc., leaves a balance of 29,024,064 acres, or 2,041,716 acres less than our actual requirements.

The above illustrates the tendency prevailing of overstocking our farms and the urgent necessity of artificial feeding nearly the whole year round, as the seasons of late years have been so irregular that we cannot count or rely upon green pasturage.

W. OOSTERLAAK,
Dairy Instructor, Orange Free State

Bloemfontein.

## MANURING MAIZE, POTATOES, AND OATS.

To the Editor of the *Agricultural Journal.*

SIR,—Will you be kind enough to inform me through the *Agricultural Journal* what you consider is the best manure, where farmyard manure is not obtainable, for mealies, for potatoes, and for oats; and the quantities per acre that should be used in each case to secure the best financial results?

The land where I intend to plant the above is near the Pretoria main road, about half-way between Orange Grove and Wynberg. Your judgment on the above would be valuable to me, and I should be very much obliged to you for same.—Yours, etc.,

J. E. MAPSTONE.

P.O. Bramley.

[The Lecturer in Chemistry, School of Agriculture, Potchefstroom (Mr. T. G. W. Reinecke), replied:—No definite recipe of artificial manures can be prescribed for all and every type of soil, and as I have no definite data in regard to your soil I can only in a general way indicate the lines on which you should manure for the crops mentioned, taking the average Transvaal soil as a basis. On most of our Transvaal soils high-grade superphosphate only, at the rate of 200 lb. per acre broadcast, is sufficient manuring for oats and mealies the first two or three seasons; after that time a nitrogenous manure in the form of blood manure at the rate of 100 lb. per acre should be applied as well, mixed with the above-mentioned amount of superphosphate. The farmer gets the best *immediate* economic returns from artificial manures by applying them in the rows with the seed, but this is not possible or advisable where fairly big quantities like the above are applied. The larger quantities are advisable with a view to increasing the soil fertility in addition to cropping with profit. With regard to the manuring of potatoes, one should keep in mind the fact that this crop requires a soil containing plenty of humus. For this reason farmers save all the available dung for their potatoes. I should advise you to pick out the ground which has most humus, and then apply 300 to 400 lb. per acre of a mixture of equal parts high-grade superphosphate and Government guano. If guano is not procurable, use blood manure instead. Further, as a trial with your potatoes you should manure an acre with the above-mentioned mixture, to which you have added 40 to 50 lb. sulphate of potash, and compare the yields by actual measurement—or better, by weighing—with an acre of the main crop which got no potash but phosphates (as superphosphate) and nitrogen (in the form of blood manure or guano) only. I shall be pleased to hear of the result of your manuring.]

## SHEEP QUERIES.

To the Editor of the *Agricultural Journal.*

SIR,—Kindly inform me through medium of the *Journal* whether it is fault when a Rambouillet ram has a stained tongue. Is the constitution of a Tasmanian sheep strong enough for this district? Which sheep has the best wool, Rambouillet or Tasmanian? Is a cross between these two breeds advisable for this district?—Yours, etc.,

J. J. SWART.

Sodas, Heilbron.

[The Sheep and Wool Expert, Bloemfontein (Mr. John McNab), replied:—It is a slight fault for a sheep to have a stained tongue, but so slight that good judges do not usually look at the tongue at all. The constitution of Tasmanian sheep is strong enough for Heilbron conditions. Generally speaking Tasmanian is a better wool than Rambouillet. A cross between the different breeds is not advisable. Saxon and Tasmanian would not be considered a cross, neither would Rambouillet-Wanganella be a severe cross.]

## TREATMENT OF COWS IN MILK.

To the Editor of the *Agricultural Journal.*

SIR,—Would you kindly inform me the best treatment for my cows in milk. They have gone so poor and seem to have gone completely off milk. I have tried several remedies and failed. I feed then night and morning and still they do not improve, and all their calves seem to pine away and then die. At first I thought they were being given poison by some one, but cannot find any trace of anything. Perhaps you could tell me what to do with them. I may state they are all inoculated for redwater and gall-sickness, but that was some months ago.—Yours, etc.,

JAMES E. MOWTELL.

Box 17, Sabie.

[The Superintendent of Dairying (Mr. E. O. Challis) replied:—It would appear to me that you have allowed your cows at some time during their lactation period to get too low in condition, and once this occurs it is most difficult to bring them back into condition again, and still more so to increase their diminished flow. Crushed mealies are quite good feed for cows, but fed alone they are not a balance ration, and the addition of bran or crushed oats would greatly imporve the condition of your cows. I presume you have no root crops available or any green forage crops, as there is no doubt your cows require succulent food of some sort. If you are feeding hay this would be improved by sprinkling same with treacle. Mix one part of treacle with seven parts of water and heat same in a copper, or large kaffir pot, and sprinkle the hay whilst the liquid is warm a few hours before being fed. About ½ lb. of treacle per cow is the right quantity to use. The reason for your calves dying is difficult to say in view of the fact that no post-mortem has been made by a veterinary surgeon, but everything points to them having suffered from poverty in a similar manner to your cows. You should feed your calves on crushed oats, and these are best fed to them dry. You might also keep an eye on them and see if they are not infected with worms. Should you require any further information or would like an officer of this Division to visit your farm I shall be pleased to arrange for same on hearing from you.]

## FEEDING AT EGG-LAYING COMPETITIONS.

To the Editor of the *Agricultural Journal.*

SIR,—In addition to my report on the Rosebank Laying Competition and returns of eggs laid by the breeding pens at Elsenburg, it may interest your readers to know the methods of feeding in vogue here.

I wish to explain, firstly, that as the ten pens, the records of which is given monthly, are not at Elsenburg for competitive purposes but as breeding pens, our object is not to feed a highly concentrated food for abnormal egg production. Secondly, it is our object to feed on a menu which is possible to every farmer. That is, all the grains used are produced on the farm, are ground in our own mill, and mixed in our own bins. By following out this rule it is hoped that we will be able to convince farmers, and smallholders in particular, that poultry can be successfully raised on such grains as any average Western Province farm can produce.

The following are a few of the combinations in use here which give satisfactory results:—

(1) *Winter morning mash*—

2 parts bran; 1 part mealie meal.

The mealie meal we boil (on the day prior to use) until it is quite a stiff mass. It is then mixed with two parts of bran until the whole forms a crumbly, appetizing breakfast. Feed approximately a dry pint measure of the mash to half a dozen fowls. When ground mealies are not available we substitute the following:—

4 lb. sharps; 2 lb. barley meal.

The barley meal is well scalded with boiling water and then dried off with pollard.

(2) *Another morning mash* we have frequently used this winter is composed as folows:—

2 parts pollard; 1 part bran; 2 parts bruised oats.

The bran well scalded and mixed with pollard and bruised oats.

(3) *Yet another morning mash* used about three times weekly consists of small potatoes, potato peelings, and any other vegetables of no use in the farm kitchen, well cooked, drained off, well mashed, and mixed with equal parts of bran and pollard. This mash is greatly relished.

I may state here that all our soft foods are mixed overnight, and naturally are slightly fermented when fed. What is aimed at is variety in foods. It will be noticed that no meat meal of any sort is mentioned; the reason for this is that we do not use any.

*Midday meal.*—This is composed chiefly of kitchen greenstuffs, such as cabbage leaves, spinach, celery leaves, leeks, carrot and turnip tops, chopped up finely and fed as much as the birds will eat greedily.

Green food is provided daily, chiefly in the manner described.

*Evening meal.*—This consists chiefly of wheat, crushed mealies, or whole oats. I very much prefer the crushed mealies for winter evenings, and wheat and oats for the warmer weather. Here again vary the diet periodically. *Even in winter*, when mealies are plentiful, do not feed this grain for weeks on end, as wheat or oats would be deemed a relish occasionally. Shell grit we have to purchase as we do not produce it. Grit we get from the bed of the stream running through the farm.

The above diet, with as much pure water as the poultry will drink, constitutes our rather simple system of feeding and gives very satisfactory results, and helps to show the student and farmer which products of the farm make suitable poultry foods.

Our pens at Elsenburg are periodically turned over with the assistance of a Planet Junior hand cultivator.

Mention should be made of the fact that a little salt is added to all soft mashes. This tends to keep the birds healthy.—Yours, etc.,

W. O. JOHN,
Lecturer in Poultry.

School of Agriculture, Elsenburg.

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## BEE DISEASE AT JOHANNESBURG.

To the Editor of the *Agricultural Journal*.

SIR,—I note with interest an article you have in this month's issue entitled "Bee Disease at Johannesburg."

I lost a stock through a similar disease as early as 1897 in Rondebosch; in fact I was so convinced that it was foul brood that I eventually destroyed the hive—unfortunately I have mislaid the notes made at the time.

I have proved conclusively that bees have a similar disease in their wild state in districts where they are being continually driven by natives, especially in the vicinity of mines in Rhodesia, where I made most of my observations.

In every case where found the colonies were weak, and I came to the conclusion that the cause was the continual robbing done by natives.—Yours, etc.,

R. N. FLETCHER.

## PRESERVING AND PACKING OF BUTTER.

To the Editor of the *Agricultural Journal.*

SIR,—We would be very much obliged if you would kindly inform us of the best-known way to preserve butter during the hot season so as to be marketable during May or even later, there being no cold storage here; and the best way to pack butter to keep it fresh and cool while sending it to the market. Our nearest market is Kimberley, and the butter has to go by post-cart and it takes thirty-six hours to reach Kimberley.—Yours, etc.,

JACOBSON & SARIF.

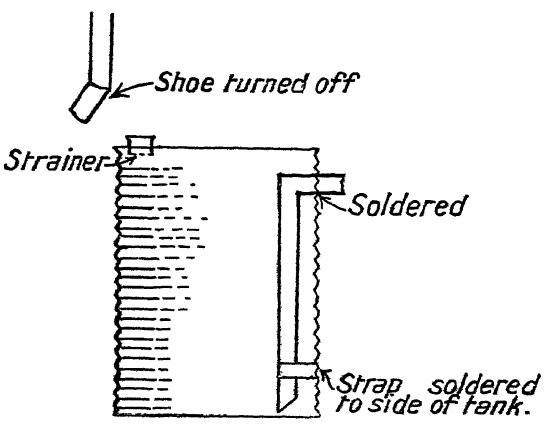
Postmasburg, via Griquatown.

[Mr. V. G. Zahn, of the Division of Dairying, replied:—For preserving butter add Lymm. pure salt (1 oz. per 1 lb. of butter) to the butter while on the worker. After having worked this salt well into the butter allow it to stand for four hours and then work well again. The butter must then be closely packed into a smooth surface jar or enamel bucket. When this jar is full level the top and place a piece of butter-paper on the top, which is then covered with a layer of dry salt half an inch thick, and again covered with butter-paper. Fresh butter is best packed in a box on trays and the box wrapped in a bag which has been dipped into brine water made with any coarse salt (1 lb. of salt to 1½ gallons of water). This will keep the bag damp longer than pure water will.]

## TREATMENT OF WATER TANKS.

To the Editor of the *Agricultural Journal.*

SIR,—In your July issue I notice an inquiry from Mr. W. Behrens about water tanks and their treatment, and, although the queries raised have been dealt with by the Lecturer in Engineering at the Potchefstroom School of Agriculture, I think the result of my experience in this matter—which has been considerable — might prove of use to the inquirer, and I accordingly offer him the following suggestions, seeing he appears keen on pure water—a very proper desire.




Pure water in a suitable tank will keep sweet and sound for years, and it is therefore imperative that the water must be clean on entering the tank. Now, this cannot be done with roof water by merely straining it through wire gauze, for dust and other dirt that blow on to the roof and into the gutters carry contamination, though leaves, and many other objects, are arrested. To prevent the spread of disease such as typhoid, diphtheria, dysentery, etc., it is essential that the first flow from the roof should *not be allowed* to enter the tank, and to arrange this it is merely necessary to keep the down-spout disconnected from the tank until such time as the roof has washed clean. This is all the more necessary after long droughts. A simple means of arranging this is to have the strainer a fixture over the orifice on the tank with a rim round it, and for the lower portion of the down-spout to terminate

with a shoe, which must always be turned away from the orifice until such time as the water runs clean. It should hardly be necessary to add that at such times the gutters must be brushed to aid the running water in cleaning them.

Another important matter is the overflow to the tank. One generally sees a tank provided with a short spout at the top for the overflow, and there is nothing to prevent the fresh water entering from overflowing straight away, leaving the old water undisturbed at the bottom of the tank. To obviate this the overflow pipe should rise from the bottom of the tank, terminating in the spout at the top and soldered in position, somewhat like an inverted down-spout with its shoe.

With clean water running in I have used a concrete underground tank very successfully, but it must be so carefully built as to keep ants out, as these insects contaminate water in a very short space of time.—Yours, etc.,

A. HEATLIE, M.I.C.E.

Ceres.

## TREATMENT OF A SNAKE-BITTEN HORSE.

To the Editor of the *Agricultural Journal.*

SIR,—I have been requested by some friends to send you the following note, which may be of interest to some of the readers of your journal:—

A few weeks ago a valuable imported horse of mine, whilst going to drink, trod on a ringhals which bit the animal, first in the right and then in the left leg, but my stable boy only informed me the following morning of the fact, when both legs were fearfully swollen, particularly the right leg. Experts whom I consulted advised me to shoot the horse and put it out of agony. I found the wound in the right leg, which I enlarged and put in some permanganate of potash.

Having by personal experience found that in a vlei near to my stable any number of leeches were to be got I managed to get the horse into the water and tied it up for three days. Each evening when bringing the horse out of the water the legs were covered with leeches, but each day the swelling went down. After this treatment for three days I was able to inspan the horse, but from both legs the hair fell out in patches, which, after a couple of weeks, have become covered again.

I am sending you this note by advice of one of the leading doctors in Boksburg, who has seen the horse through the whole state of his illness and who is now fishing for leeches for his patients.—Yours, etc.,

H. ALRIGGO.

Boksburg.

# Land for Disposal.

APPLICATIONS will be received at the Department of Lands, Pretoria, for a period of ten weeks from the 3rd October, and for such time thereafter as the holdings or any of them remain unallotted, for the farms referred to in the accompanying table I, to be disposed of on lease for a period of five years, with the option of acquiring the land at any time during the currency of the lease, or at the expiration thereof, on terms of Conditional Purchase Lease extending over a period of twenty years, under and subject to the provisions of the Land Settlement Act, No. 12 of 1912, and any regulations published thereunder.

A clause will be inserted in the leases which it is proposed to issue in respect of those farms on which boreholes have been sunk, giving the Government access to and the right to take water from the borehole for drilling purposes for a period of five years from the date of the lease. Should any of the holdings be allotted to a partnership, it will be a condition of allotment and of the lease that all the partners must reside on the land for a period of at least eight months in each year.

The successful applicant for any of the above farms on which boreholes have been sunk will be required to satisfy the Department that he has immediately available suitable machinery for raising water from the borehole, and to give an assurance that he will not raise water without such machinery.

The lease to be issued will contain conditions relative to residence, improvements, fencing, and such other conditions as are usually inserted in agricultural leases granted under the Land Settlement Act, No. 12 of 1912.

The rent paid during the lease period of five years is not deducted from the purchase price in the event of the option to purchase being exercised.

All rights to minerals, mineral products, mineral oils, metals, and precious stones are reserved to the Crown.

All applications must be submitted on the prescribed forms, which, together with copies of the regulations framed under the Act, can be obtained from the magistrates of the districts in which the farms are situate, or from the Secretary for Lands, Pretoria.

The Lands Department make the following observations with regard to these holdings:—

(1) Suitable for agricultural and stock farming; no permanent surface water; no timber. The road from the farm to Malmesbury is a divisional road, and in good condition. The farm is bounded as follows: On the north by Nieuwe Fontein (portion of Klip Fontein) and Annex Nieuweland, on the east by Nieuweland (Lot A of Kleine Valley) and Lot B of Kleine Valley, on the south by Groot and Klein Klip Vlei Outspan, and on the west by a trek path 100 roods wide (portion of Groot and Klein Klip Vlei Outspan).

(2) Suitable for agricultural and stock farming; sparsely wooded with scrub; there are some holes (dug by Kaffirs) which hold water, the

supply of which is believed to be permanent; malarious in summer; natives living in the vicinity.

(3) Suitable for agricultural and stock farming; fairly well wooded; slightly malarious in very wet seasons; native labour scarce. There are two boreholes on the holding, one giving an estimated daily water supply of 4800 gallons, and the other 300 gallons.

(4) Suitable for agricultural and stock farming; fairly well wooded; no permanent water supply; healthy; natives living in the vicinity. An amount of £534. 10s. 1d. has been added to the valuation of the farm in respect of the cost of fencing the holding. The improvements on this farm consist of a dwelling-house and an outhouse valued in all at approximately £370. It will be a condition of allotment that the successful applicant for this holding will be required to pay over to the Government in reduction of the purchase price of the farm any sums which may be recovered from an adjoining owner in respect of the half share of the fencing of the land.

(5) Suitable for agricultural and stock farming; no timber; fair water supply from two fountains on the land; healthy; natives living in the vicinity. The school site on this farm, in extent 1 morgen 25 square roods, is not included in the holding. The improvements on the land consist of a dwelling-house with two rooms, on a stone foundation, with raw brick walls and a grass roof; a small stable, stone walls, and a grass roof; a stone kraal and a damaged dam which would be repaired at a small cost.

(6, 7, 8) Suitable for agricultural and stock farming; considered healthy; natives in the vicinity. There is a borehole on each of the holdings, giving estimated daily supplies of water as follows: No. 1, 14,400 gallons; No. 2, 12,960 gallons; No. 3, 7200 gallons.

(9) Suitable for agricultural and stock farming; sparsely wooded; healthy; native labour scarce. There is a borehole on the holding giving an estimated daily water supply of 72,000 gallons.

(10) Suitable for agricultural and stock farming; no permanent surface water; sufficient timber for farm use; malarious; native labour scarce.

(11) Suitable for mixed farming, horse-sickness prevalent; some scrub; no permanent surface water; malarious. There are three small houses and a few fruit trees on the holding; these improvements are, however, valueless. The farm adjoins Matala's location.

(12) Suitable for agricultural and stock farming; fairly well wooded with acacias; good supply of water from Malips and Oliphants Rivers; malarious in summer; natives living on the land. The area of the farm as advertised does not include two morgen, which have been reserved as a school site. The improvements on the land, which consist of buildings, tobacco shed, cleared lands, water-furrow and dam, are valued at approximately £118, and are included in the valuation of the farm. The farm is entitled specially to a half share in the water running in a certain furrow taken out of the Malips River running through the farm Inkomst No. 466, to be used at such times and subject to such conditions as are more fully set out in the Deed of Servitude 756/93, and further entitled to the right to take out a water-furrow in the Malips River, on the said farm Inkomst No. 466, and to construct same on the said farm leading to the property herein referred to, as more fully set forth in Deed of Servitude No. 757/93, and subject and entitled generally to such conditions as are mentioned in the said Deeds of Servitude.

## LANDS FOR DISPOSAL.—I.

| Holding Number. | Registered Name and Number. | Area. | | Purchase Price. | Rental during lease period of 5 years. 1st year, nil. | | If option of conditional purchase be exercised—Half-yearly Instalment, which includes Capital and Interest at 4 per cent. spread over 20 years. | Approximate area of. | | Nearest Railway Station. | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Morgen. | Sq. Roods. | | 2nd and 3rd years, 2 per cent. per annum. Half-yearly Rental. | 4th and 5th years, 3½ per cent. per annum. Half-yearly Rental. | | Pastoral Land. | Arable Land. | | Miles. |
| | **DIVISION OF MALMESBURY, CAPE PROVINCE.** | | | | | | | | | | |
| | | | | £ s. d. | £ s. d. | £ s. d. | £ s. p. | | | | |
| 1 | Grootvlei ... ... ... ... ... | 406 | 426 | 2058 16 0 | 20 11 9 | 36 0 7 | 75 5 3 | 56 | 350 | Moorreesburg | abt. 12 |
| | **PRETORIA DISTRICT, TRANSVAAL.** | | | | | | | | | | |
| 2 | Gert-zijn-Pan No. 2 ... ... ... | 427 | 168 | 187 6 0 | 1 17 6 | 3 5 8 | 6 16 11 | 142 | 285 | Settlers Siding | 15 |
| | **RUSTENBURG.** | | | | | | | | | | |
| 3 | Welgewaagd No. 450 ... ... ... | 2461 | 137 | 1137 6 0 | 11 7 6 | 19 18 2 | 41 11 6 | 2464 | | Rustenburg | 104 |
| 4 | Doornspruit No. 646 ... ... ... | 2656 | 253 | 2981 9 0 | 29 16 3 | 52 3 6 | 108 19 9 | 2656 | | „ | 18 |
| 5 | Portion named Kransfontein of the farm Rietfontein No. 652 | 662 | 518 | 1325 15 0 | 13 5 2 | 23 4 1 | 48 9 3 | 662 | | Cyferbult | 3 |
| | **LICHTENBURG.** | | | | | | | | | | |
| 6 | Holding No. 1, comprising portion "A" of the farm Schatryk No. 356 | 512 | 359 | 683 1 0 | 6 16 7 | 11 19 1 | 24 19 5 | 512 | | Delarey | about 7 |
| 7 | Holding No. 2, comprising portions "B" and "C" of the farm Schatryk No. 356 | 750 | 26 | 994 11 0 | 9 18 11 | 17 8 1 | 36 7 2 | 750 | | „ | „ 7 |
| 8 | Holding No. 3, comprising portions "D" and "E" of the farm Schatryk No. 356 | 749 | 555 | 993 10 0 | 9 18 8 | 17 7 8 | 36 6 4 | 749 | | „ | „ 7 |
| | **WATERBERG.** | | | | | | | | | | |
| 9 | Springhaanslaagte No. 2094 ... ... | 1774 | 125 | 1357 10 0 | 13 11 6 | 23 15 2 | 49 12 6 | 1774 | | Naboomspruit | 20 |
| 10 | Rhenosterpan No. 1509 ... ... ... | 1317 | 285 | 350 15 0 | 3 10 2 | 6 2 9 | 12 16 5 | 1297 | 20 | Nylstroom | 130 |
| | **PIETERSBURG.** | | | | | | | | | | |
| 11 | Christina No. 153 and Utrecht No. 852... | 533 | 477 | 427 1 0 | 4 5 5 | 7 9 6 | 15 12 3 | 533 | | Pietersburg | [illegible] |
| 12 | Portion of Scheiding No. 587 ... ... | 775* | — | 794 11 0 | 7 18 11 | 13 18 1 | 29 0 11 | 228 | 517 | „ | 50 |

* 30 Morgen irrigable land.

## LANDS FOR DISPOSAL.—II.

| Holding Number. | Registered Name and Number. | Area. Morgen. | Area. Sq. Roods. | Purchase Price. | Rental during lease period of 5 years. 1st year, nil. 2nd and 3rd years, 2 per cent. per annum. Half-yearly Rental. | Rental during lease period of 5 years. 1st year, nil. 4th and 5th years, 3½ per cent. per annum. Half-yearly Rental. | If option of conditional purchase be exercised—Half-yearly Instalment, which include Capital and Interest at 4 per cent. spread over 20 years. | Approximate area of Pastoral Land | Approximate area of Arable Land. | Nearest Railway Station. | Miles. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **DIVISION OF CATHCART, CAPE PROVINCE.** | | | | | | | | | | |
| | | | | £ s. d. | £ s. d. | £ s. d. | £ s. d. | | | | |
| 1 | Tylden Annex ... ... ... ... | 84 | 118 | 286 16 0 | 2 17 4 | 5 0 4 | 10 9 8 | 84 | | Tylden Loop | ½ |
| | **MARICO DISTRICT, PROVINCE OF TRANSVAAL.** | | | | | | | | | | |
| 2 | Portion "A," Magdalena's Kuil No. 239 | 1511 | 246 | 705 12 0 | 7 1 1 | 12 7 0 | 25 15 10 | 1511 | | Zeerust | 30 |
| 3 | Portion "B," Magdalena's Kuil No. 239 | 1511 | 256 | 705 12 0 | 7 1 1 | 12 7 0 | 25 15 10 | 1511 | | " | 30 |
| 4 | Zandbult No. 242 and Bedrog No. 118 ... | 3204 | 82 | 1642 11 0 | 16 8 6 | 28 14 11 | 60 0 11 | 3204 | | " | 48 |
| 5 | Lekkerdorst No. 247 ... ... ... | 1538 | 417 | 483 17 0 | 4 16 9 | 8 9 4 | 17 13 9 | 1380 | 158 | Ramutsa | 15 |
| | **RUSTENBURG.** | | | | | | | | | | |
| 6 | Vrischgewaagd No. 1150 ... ... ... | 3756 | 512 | 1907 6 0 | 19 1 6 | 33 7 8 | 69 14 5 | 3756 | | Rustenburg | 82 |
| 7 | London No. 453 ... ... ... ... | 2490 | 555 | 1270 3 0 | 12 14 0 | 22 4 6 | 46 8 8 | 2490 | | " | 106 |
| 8 | Roodebloem No. 442 ... ... ... | 2696 | 75 | 1047 11 0 | 10 9 6 | 18 6 8 | 38 5 11 | 2496 | 200 | " | 98 |
| 9 | Zondagskuil No. 808 ... ... ... | 3028 | 16 | 790 3 0 | 7 18 0 | 13 16 7 | 28 17 8 | 2508 | 500 | Warmbaths | 80 |
| | **WATERBERG.** | | | | | | | | | | |
| 10 | Keerom No. 2162 ... ... ... ... | 1385 | 1 | 891 0 0 | 8 18 2 | 15 11 10 | 32 11 5 | 1385 | | Settlers Siding | 26 |
| 11 | Spitzpunt No. 1832 ... ... ... | 2021 | 523 | 1291 14 0 | 12 18 4 | 22 12 1 | 47 4 5 | 2021 | | " | 20 |
| | **PIETERSBURG.** | | | | | | | | | | |
| 12 | Vaalkopje No. 1760 ... ... ... | 568 | 75 | 299 7 0 | 2 19 10 | 5 4 9 | 10 18 10 | 368 | 200 | Pietersburg | 50 |
| 13 | Sour Apple Tree No. 958 ... ... ... | 1442 | 338 | 770 6 0 | 7 14 1 | 13 9 8 | 28 3 2 | 900 | 542 | " | 47 |

Applications are also being invited on the same conditions as the above for a period of ten weeks from the 21st October, for the holdings enumerated in the second of the accompanying tables. With regard to these holdings the Lands Department observes:—

(1) Suitable for agricultural and stock farming on a small scale; soil and grazing poor. The railway line from Queenstown to East London passes over this land. The property is bounded as follows:—

*Southern portion.*—South-easterly by Traders Drift; westerly by Weltevreden or Thorn Park; north-westerly by high water mark, Zwart Kei River inner bank, and Tylden, Annex Railway Reserve; northerly by Tylden, Annex Railway Reserve; easterly by Tylden, Annex Railway Reserve; north-easterly by Tylden, Annex Railway Reserve.

*Northern portion.*—South-easterly by Traders Drift and Tylden, Annex Railway Reserve; northerly by high water mark, Zwart Kei River inner bank; southerly by Tylden, Annex Railway Reserve; south-westerly by Tylden, Annex Railway Reserve; easterly by Tylden, Annex Railway Reserve; westerly by Tylden, Annex Railway Reserve.

Internally by Lots Nos. 210, 212, 213, of Village of Tylden.

(2, 3) Suitable for agricultural and stock farming; fairly well wooded; healthy; natives living in the neighbourhood; good grazing. There is a borehole on each of the holdings giving an estimated daily water supply of 12,000 gallons for each hole. Particulars of the boreholes are as follows:—

*Portion A (No. 2).*—Depth, 129 feet; diameter, 6 inches; depth from surface at which water was struck, 86 feet; depth from surface to which water was found to rise, 73 feet; depth to which pump-cylinder was inserted, 122 feet; casing inserted, 54 feet by 6 inches.

*Portion B (No. 3).*—Depth, 200 feet; diameter, 6 inches; depth from surface at which water was struck, 109 feet and 183 feet; depth from surface to which water was found to rise, 93 feet; depth to which pump-cylinder was inserted, 180 feet; casing inserted, 106 feet by 6 inches.

(4) Suitable for agricultural and stock farming; well timbered; healthy; natives living in the neighbourhood; good grazing farm. There is a borehole on the holding, particulars of which are as follows: Depth, 91 feet; diameter, 6 inches; depth from surface at which water was struck, 54 feet; depth from surface to which water was found to rise, 43 feet; depth to which pump-cylinder was inserted, 65 feet; estimated yield per twenty-four hours, 24,000 gallons; casing inserted, 60 feet by 6 inches.

(5) Suitable for mixed farming; partly covered with bush; no permanent surface water; malarious in summer; many natives in vicinity. A borehole was sunk on this holding to a depth of 386 feet, but was unsuccessful in obtaining water.

(6) Suitable for agricultural and stock farming; fairly well wooded; healthy; native labour scarce. There is a borehole on the holding giving an estimated daily water supply of 40,200 gallons, particulars of which are as follows:—Depth, 109 feet; diameter, 6 inches; depth from surface at which water was struck, 86 feet; depth from surface to which water was found to rise, 78 feet; depth to which pump-cylinder was inserted, 100 feet; casing inserted, 100 feet 5 inches by 6¼ inches.

(7) Suitable for agricultural and stock farming; fairly well wooded; slightly malarious in very wet seasons; native labour scarce; good grazing. There is a borehole on the holding, particulars of which are as follows:—Depth, 260 feet; diameter, 6 inches; depth from surface at which water was struck, 180 feet; depth from surface to which water was found to rise, 98 feet; depth to which pump-cylinder was inserted, 184 feet; estimated yield per twenty-four hours, 14,400 gallons; casing inserted, 194 feet by 6 inches.

(8) Suitable for agricultural and stock farming; fairly well wooded; slightly malarious in very wet seasons; natives living in the vicinity. There is a borehole on the holding, particulars of which are as follows:—Depth, 344 feet; diameter, 6 inches; depth from surface at which water was struck, 100 feet; depth from surface to which water was found to rise, 44 feet; estimated yield per twenty-four hours, 1740 gallons; casing inserted, 23 feet by 6 inches.

(9) Suitable for mixed farming; fairly well wooded; no permanent surface water, but should be obtainable by opening up existing pits; malarious; natives living in the neighbourhood.

(10) Suitable for agricultural and stock farming; fairly well wooded; considered healthy; natives living in the vicinity. There is a borehole on the holding giving an estimated daily water supply of 2400 gallons, particulars of which are as follows:—Depth, 350 feet; diameter, 6 inches; depth from surface to which water was found to rise, 205 feet; casing inserted, 145 feet by 6¼ inches.

(11) Suitable for agricultural and stock farming; fairly well wooded; considered healthy; natives living in the vicinity. There is a borehole on the holding giving an estimated daily water supply of 1700 gallons, particulars of which are as follows:—Depth, 630 feet; diameter, 6 inches; depth from surface at which water was struck, 240 feet; depth from surface to which water was found to rise, 154 feet; casing inserted, 182 feet by 6¼ inches.

(12) Suitable for agricultural and stock farming; fairly well wooded; malarious; natives living in the vicinity. There is a borehole on the holding, particulars of which are as follows:—Depth, 150 feet; diameter, 6 inches; depth from surface at which water was struck, 90 feet; depth from surface to which water was found to rise, 74 feet; depth to which pump-cylinder was inserted, 140 feet; estimated yield per twenty-four hours, 10,320 gallons; casing inserted, (plain) 77 feet 6 inches by 6 inches, (perforated) 15 feet 6 inches by 6 inches.

(13) Suitable for agricultural and stock farming; sparsely wooded with thorn bushes; malarious; natives in vicinity. There is a small supply of water on the farm.

# Export of Fruit.

THE following statements show the description and declared value of fresh fruit exported from the Union of South Africa during the months of August and September, 1913, distinguishing port of shipment :—

AUGUST, 1913.

| Description. | Via Capetown. | Via Port Elizabeth. | Via East London. | Via Durban. | Via Delagoa Bay. | TOTAL. |
|---|---|---|---|---|---|---|
| | £ | £ | £ | £ | £ | £ |
| Apples ... ... ... | 78 | — | — | 13 | — | 91 |
| Apricots ... ... ... | — | — | — | — | — | — |
| Bananas ... ... ... | 52 | — | 2 | 49 | — | 103 |
| Grapes ... ... ... | — | — | — | — | — | — |
| Guavas ... ... ... | — | — | — | — | — | — |
| Lemons ... ... ... | 18 | — | — | 5 | — | 23 |
| Mangoes ... ... ... | 6 | — | — | — | — | 6 |
| Melons ... ... ... | — | — | — | — | — | — |
| Naartjes ... ... ... | 215 | 2 | 1 | 232 | — | 450 |
| Nectarines ... ... | — | — | — | — | — | — |
| Oranges ... ... ... | 2,046 | 934 | 2 | 235 | — | 3,217 |
| Paw-paws ... ... ... | — | — | — | 20 | — | 20 |
| Peaches ... ... ... | — | — | — | — | — | — |
| Pears ... ... ... | 8 | — | — | — | — | 8 |
| Plums ... ... ... | — | — | — | — | — | — |
| Pines ... ... ... | 40 | — | 1 | 78 | — | 119 |
| Other kinds ... ... | 2 | — | 2 | 25 | — | 29 |
| TOTAL ... £ | 2,465 | 936 | 8 | 657 | — | 4,066 |

SEPTEMBER, 1913.

| Description. | Via Capetown. | Via Port Elizabeth. | Via East London. | Via Durban. | Via Delagoa Bay. | TOTAL. |
|---|---|---|---|---|---|---|
| | £ | £ | £ | £ | £ | £ |
| Apples ... ... ... | 51 | — | — | 5 | — | 56 |
| Apricots ... ... ... | — | — | — | — | — | — |
| Bananas ... ... ... | 37 | — | — | 25 | — | 62 |
| Grapes ... ... ... | — | — | — | — | — | — |
| Guavas ... ... ... | — | — | — | — | — | — |
| Lemons ... ... ... | 12 | — | — | 2 | — | 14 |
| Mangoes ... ... ... | — | — | — | — | — | — |
| Melons ... ... ... | — | — | — | — | — | — |
| Naartjes ... ... ... | 21 | — | — | 181 | — | 202 |
| Nectarines ... ... | — | — | — | — | — | — |
| Oranges ... ... ... | 566 | 814 | 1 | 424 | — | 1,805 |
| Paw-paws ... ... ... | — | — | — | 12 | — | 12 |
| Peaches ... ... ... | — | — | — | — | — | — |
| Pears ... ... ... | — | — | — | — | — | — |
| Pineapples ... ... | 37 | — | 2 | 39 | — | 78 |
| Plums ... ... ... | — | — | — | — | — | — |
| Other kinds ... ... | 1 | — | 1 | 7 | — | 9 |
| TOTAL ... £ | 725 | 814 | 4 | 695 | — | 2,238 |

# South African Produce Markets.

## CAPETOWN.

The Produce Department of the firm of R. Müller, Capetown, reports under date of the 30th October, 1913, as follows :—

*Ostrich Feathers.*—Since issuing my last report, the London auction sales took place, closing on the 10th instant. Although the attendance was good and the demand fair, there was an average decline of 10 per cent., which specially referred to medium and narrow whites and feminas, inferior spadonas, white boos. Dark feminas, drabs, superior spadonas, and floss were firm. Short floss rose by 10 per cent.

The Capetown market is altogether in sellers' favour, especially considering the results at the recent London sales. Exporters as well as local manufacturers are competing satisfactorily and taking up parcels readily.

Prices now ruling are as follows :—

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| Primes | 18 | 0 | 0 | to | 37 | 10 | 0 |
| First | 9 | 10 | 0 | „ | 14 | 10 | 0 |
| Second whites | 6 | 0 | 0 | „ | 9 | 0 | 0 |
| Third whites | 4 | 10 | 0 | „ | 6 | 0 | 0 |
| Inferior and stalky whites | 2 | 10 | 0 | „ | 4 | 10 | 0 |
| Byocks and fancy | 3 | 0 | 0 | „ | 10 | 0 | 0 |
| Superior feminas | 10 | 0 | 0 | „ | 14 | 0 | 0 |
| First feminas | 7 | 0 | 0 | „ | 9 | 10 | 0 |
| Second feminas | 4 | 10 | 0 | „ | 7 | 0 | 0 |
| Third feminas | 2 | 10 | 0 | „ | 4 | 10 | 0 |
| Greys | 3 | 10 | 0 | „ | 9 | 10 | 0 |
| White boos | 1 | 7 | 6 | „ | 2 | 5 | 0 |
| Light boos | 0 | 15 | 0 | „ | 2 | 0 | 0 |
| Dark boos | 0 | 5 | 0 | „ | 0 | 15 | 0 |
| Inferior boos and tipless | 0 | 2 | 6 | „ | 1 | 5 | 0 |

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| Long blacks | 3 | 0 | 0 | to | 4 | 10 | 0 |
| Medium blacks | 1 | 5 | 0 | „ | 2 | 10 | 0 |
| Short blacks | 0 | 5 | 0 | „ | 1 | 0 | 0 |
| Long floss blacks | 1 | 5 | 0 | „ | 2 | 0 | 0 |
| Medium floss blacks | 0 | 15 | 0 | „ | 1 | 5 | 0 |
| Short floss blacks | 0 | 7 | 6 | „ | 0 | 15 | 0 |
| Long drabs | 2 | 10 | 0 | „ | 3 | 10 | 0 |
| Medium drabs | 0 | 15 | 0 | „ | 2 | 0 | 0 |
| Short drabs | 0 | 5 | 0 | „ | 0 | 10 | 0 |
| Long floss drabs | 1 | 10 | 0 | „ | 2 | 0 | 0 |
| Medium floss drabs | 0 | 17 | 6 | „ | 1 | 10 | 0 |
| Short floss drabs | 0 | 5 | 0 | „ | 0 | 10 | 0 |
| Inferior long blacks and drabs | 1 | 5 | 0 | „ | 2 | 10 | 0 |
| Common blacks and drabs | 0 | 2 | 0 | „ | 0 | 5 | 0 |
| Spadonas | 0 | 12 | 6 | „ | 4 | 10 | 0 |

*Wool.*—In my last report I referred to the opening of the London wool sales, which finally resulted in an advance of ½d. to 1d. for snow-whites, whilst grease sold at par to an advance of ½d. Other descriptions remained unchanged.

For 1914 London wool sales have been fixed as follows, viz. :—13th January (without limit of quantity), 3rd March, 28th April, 7th July (limits, if any, to be fixed later), 29th September, and 24th November.

Sales were held at several of the principal country centres. Most of the clips offered were of exceptionally good quality and realized top prices.

Only moderate quantities of wool have been offered for sale in Capetown recently, where prices ruling now are as follows :—

| | d. | | d. |
|---|---|---|---|
| Calvinia, long | 7 | to | 7¾ |
| Calvinia, medium | 6 | „ | 7 |
| Karroo and Roggeveld | 6½ | „ | 9¼ |
| Short burry wools, heavy | 4 | „ | 4¾ |
| Short burry wools, light | 4¾ | „ | 5½ |
| C. and C., best grease | 6 | „ | 6⅝ |
| C. and C., medium | 5 | to | 6 |
| C. and C., inferior | 2 | „ | 4 |
| White coarse | 6¾ | „ | 7¼ |
| Short Hopefield and Piquetberg | 7 | „ | 8 |
| Short Malmesbury | 8 | „ | 9 |

*Skins.*—At the London sales of goatskins 223,160 skins were offered for sale, of which 141,948 were sold. The demand for heavy weights and medium weights was slow. All other descriptions were in good demand. The advance paid showed ½d. for light weights Western Province; ¾d. for extra light weights; ¼d. to ½d. for selected Capetown medium weights; ¾d. to 1d. for kids; ½d. on sun-drieds; 1d. for dry damageds; ½d. for bastards.

Capetown exporters readily take up skins in any quantity, paying prices as follows :—

| | | |
|---|---|---|
| Goatskins, light | 13d. | per lb. |
| Goatskins, heavy | 11d. | „ |
| Sundried and kids | 8d. | „ |
| Angoras | 7d. | „ |
| Angoras, bastards | 10d. | „ |
| Angoras, shorn | 5½d. | „ |
| Caledon | 7½d. | „ |
| Longwools, Karroo | 6½d. | per lb. |
| Shortwools | 5d. | per lb. |
| Pelts and damaged | 4¼d. | „ |
| Capes, large | 3s. 4d. | each. |
| Capes, medium | 2s. 7d. | „ |
| Capes, cut | 1s. 6d. | „ |
| Capes, damaged and lambs | 7[illegible] | |

*Hides.*—At the October sales held in London 3900 wet salted hides were offered, but not sold. Out of 55,300 dry salted hides which were offered, 13,400 were sold. There was a rise of ¼d. for sun-dried and heavies. For extra heavies and calfskins former prices were paid. Dry salted and brined hides went at nominal prices.

There is a ready market in Capetown for hides at the following quotations, viz.:—

| | |
|---|---|
| Sound heavy hides...................... | 11d. per lb. |
| Damaged hides.......................... | 8d. „ |

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## PORT ELIZABETH.

Messrs. John Daverin & Co. report as follows under date 30th October, 1913:—

*Ostrich Feathers.*—A good business has again been done on the public market this month, about £100,000 value having changed hands.

The serious decline quoted at the London sales at the commencement of this month proved to have been fully discounted at this side, and the results of the sales had no adverse effect upon prices locally. On the contrary, the market to-day is firmer than it was at the the end of last month, and prices for some descriptions are rather higher.

Long blacks and best wings remain comparatively low in price, but practically all other descriptions are very steady, and realize very satisfactory rates. This is especially the case with common to fair average quality whites and feminas, and also drabs and floss in general. Common and damaged blacks, drabs, and floss are in strong demand at high prices.

The present level of prices is now firmly established, and owners are selling freely. There are still several high-costing parcels on hand (mostly good quality Western Province lots, bought early in the year), but the bulk of present holdings consists of newer goods which are not too high-priced, and which consequently can be marketed at current rates.

We are recommending our clients to go with the market and clear their holdings before the end of the year, as in the continued absence of demand from America it is by no means certain that present rates will be maintained indefinitely.

We do not fear any serious decline in the market in the near future, but at the same time we consider it would be unwise to speculate upon any advance on present prices.

Buyers are now operating for the London February sales, the prospects of which are generally considered as favourable, coming in as they do, for the Home spring and summer trade; but in the meantime, of course, the London December sales will take place, for which our London correspondents do not appear to think the prospects are particularly bright.

We quote the following as current prices for:—

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| ***Primes:*** | | | | | | | |
| Extra super...... | 16 | 0 | 0 | to | 25 | 0 | 0 |
| Good............ | 13 | 0 | 0 | „ | 15 | 0 | 0 |
| ***Whites:*** | | | | | | | |
| Good to super..... | 10 | 0 | 0 | „ | 12 | 10 | 0 |
| Good average..... | 7 | 10 | 0 | „ | 8 | 10 | 0 |
| Average.......... | 6 | 0 | 0 | „ | 7 | 0 | 0 |
| Common and narrow | 3 | 10 | 0 | „ | 5 | 0 | 0 |
| Good broken...... | 7 | 0 | 0 | „ | 9 | 10 | 0 |
| Thirds........... | 2 | 0 | 0 | „ | 4 | 0 | 0 |
| ***Fancies:*** | | | | | | | |
| Good............ | 6 | 10 | 0 | „ | 8 | 0 | 0 |
| Ordinary......... | 4 | 10 | 0 | „ | 5 | 10 | 0 |
| ***Feminas:*** | | | | | | | |
| Super............ | 9 | 0 | 0 | „ | 12 | 0 | 0 |
| Good average..... | 6 | 10 | 0 | „ | 8 | 0 | 0 |
| Average.......... | 4 | 0 | 0 | „ | 5 | 10 | 0 |
| Common and narrow | 2 | 5 | 0 | „ | 3 | 5 | 0 |
| Good broken...... | 5 | 0 | 0 | „ | 7 | 10 | 0 |
| Thirds........... | 1 | 10 | 0 | „ | 2 | 10 | 0 |
| ***Greys:*** | | | | | | | |
| Good............ | 6 | 0 | 0 | „ | 7 | 10 | 0 |
| Ordinary......... | 3 | 10 | 0 | „ | 4 | 15 | 0 |

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| ***Tails:*** | | | | | | | |
| Male, good, big, bold | 2 | 5 | 0 | to | 3 | 5 | 0 |
| Male, good average | 1 | 15 | 0 | „ | 2 | 0 | 0 |
| Short and narrow.. | 0 | 15 | 0 | „ | 1 | 0 | 0 |
| Female, light, good, big, bold....... | 1 | 15 | 0 | „ | 2 | 10 | 0 |
| Female, light, good average........ | 1 | 5 | 0 | „ | 1 | 10 | 0 |
| Female, light, short and narrow..... | 0 | 10 | 0 | „ | 0 | 12 | 6 |
| Female, dark, good, big, bold....... | 1 | 0 | 0 | „ | 1 | 15 | 0 |
| Female, dark, good average........ | 0 | 15 | 0 | „ | 0 | 17 | 6 |
| Female, dark, short and narrow..... | 0 | 7 | 6 | „ | 0 | 10 | 0 |
| ***Blacks:*** | | | | | | | |
| Long (special).... | 4 | 0 | 0 | „ | 5 | 10 | 0 |
| Long, good........ | 2 | 15 | 0 | „ | 3 | 5 | 0 |
| Long, fair........ | 1 | 15 | 0 | „ | 2 | 5 | 0 |
| Long, drabby..... | 1 | 0 | 0 | „ | 2 | 5 | 0 |
| Medium.......... | 1 | 5 | 0 | „ | 2 | 0 | 0 |
| Short............ | 0 | 10 | 0 | „ | 0 | 15 | 0 |
| Wiry............ | 0 | 3 | 0 | „ | 0 | 6 | 0 |
| Floss, long........ | 1 | 5 | 0 | „ | 1 | 15 | 0 |
| Floss, short....... | 0 | 10 | 0 | „ | 0 | 16 | 0 |

| *Drabs:* | £ s. d. | | £ s. d. |
|---|---|---|---|
| Long, special | 3 10 0 | to | 4 10 0 |
| Long, good | 2 5 0 | „ | 2 15 0 |
| Long, fair | 1 10 0 | „ | 2 0 0 |
| Medium | 0 17 6 | „ | 1 15 0 |
| Short | 0 5 0 | „ | 0 12 6 |
| Wiry | 0 3 0 | „ | 0 6 0 |
| Floss, long | 1 5 0 | „ | 2 0 0 |
| Floss, short | 0 9 0 | „ | 0 14 0 |

| *Spadonas:* | £ s. d. | | £ s. d. |
|---|---|---|---|
| Light (special) | 2 15 0 | to | 4 0 0 |
| Light, fair to good | 1 10 0 | „ | 2 0 0 |
| Light, narrow | 0 15 0 | „ | 1 5 0 |
| Dark | 0 15 0 | „ | 2 0 0 |
| *Chicks* | 0 2 6 | „ | 0 7 6 |

The following may be quoted as the approximate current values of unsorted parcels per line:—

| | *Whites.* | | | *Feminas.* | | |
|---|---|---|---|---|---|---|
| | £ s. d. | | £ s. d. | £ s. d. | | £ s. d. |
| Superior pluckings | 8 0 0 | to | 9 10 0 | 6 10 0 | to | 8 0 0 |
| Good average lots | 6 10 0 | „ | 7 5 0 | 5 0 0 | „ | 6 0 0 |
| Poor average lots | 5 5 0 | „ | 6 0 0 | 3 5 0 | „ | 4 5 0 |
| Common lots, stalky, narrow, and discoloured | 3 15 0 | „ | 4 15 0 | 2 10 0 | „ | 3 0 0 |

| | *Tails.* | | | *Blacks.* | | | *Drabs.* | | | *Spadonas.* | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | s. d. | | s. d. | s. d. | | s. d. | s. d. | | s. d. | s. d. | | s. d. |
| Good | 20 0 | to | 30 0 | 20 0 | to | 40 0 | 17 6 | to | 30 0 | 35 0 | to | 55 0 |
| Average | 12 6 | „ | 17 6 | 12 6 | „ | 17 6 | 12 6 | „ | 15 0 | 27 6 | „ | 32 6 |
| Poor | 7 6 | „ | 10 0 | 7 6 | „ | 10 0 | 7 6 | „ | 9 0 | 15 0 | „ | 22 6 |

It will be understood that for special lots these quotations may be exceeded.

*Wool.*—During the month of October supplies have been arriving freely, and wool catalogue sales have been resumed

Early in the month competition for all descriptions was keen and extreme prices realized.

There being a much larger selection offered buyers are discriminating, and faulty wasty wools are at least ¼d to ½d. lower than prices ruling three weeks ago.

Well-conditioned clips free from fault—both long and short—are well competed for and full prices continue to be paid.

Lately we have sold short Karroos at 9½d., and up to 9¾d. for medium grown parcels, and up to 9½d. to 9¾d. for short Adelaides and Bedfords, 8½d. for medium Aliwals.

Basuto wools are now arriving freely, and we have sold several parcels at up to 7½d., whilst for clean light lots up to 7¾d. and 8d.

Trade in England and the Continent is a little more active than a month ago; the outlook appears on the whole favourable. Supplies this season are not likely to be in excess of requirements, whilst the prospects of an increasing demand for the raw material from America, now that free wool is an established fact, seems to preclude the possibility of any weakening in values.

We quote the following as current prices:—

| | d. | | d. |
|---|---|---|---|
| Snow-white, extra superior | 22 | to | 23 |
| „ superior | 21 | „ | 22 |
| „ good to superior | 20 | „ | 21 |
| „ inferior faulty | 17 | „ | 19 |
| Grease, super long, well-conditioned, grassveld grown (special clips) | 10½ | „ | 11½ |
| Grease, super long, grassveld grown | 9 | „ | 9½ |
| Grease, super long, Karroo grown (special clips) | 9½ | „ | 10 |
| Grease, super long, Karroo grown | 8 | „ | 9 |
| Grease, super long, mixed veld | 7¼ | „ | 8 |
| Grease, light, faultless, medium, grassveld grown | 8¼ | „ | 9½ |
| Grease, light, faultless, medium, Karroo grown | 7½ | „ | 9 |
| Grease, light, faultless, short, Karroo grown | 7 | „ | 8 |
| Grease, short, very wasty | 5½ | „ | 6 |
| Cross-bred grease | 7¼ | „ | 8½ |

| | d. | | d. |
|---|---|---|---|
| Cross-bred scoured | 14 | to | 16 |
| Bellies, good | 6½ | „ | 7½ |
| Bellies, short and wasty | 5½ | „ | 6¼ |
| Locks and pieces | 3½ | „ | 5½ |
| Grease, coarse and coloured | 6¼ | „ | 7¼ |
| Scoured, coarse and coloured | 9 | „ | 14 |
| Basuto grease, short | 7 | „ | 7½ |
| O.F.S. grassveld grease, long and well-conditioned (special clips) | 8¼ | „ | 9 |
| O.F.S. grassveld grease, long and well-conditioned | 7 | „ | 7½ |
| O.F.S. grassveld grease, medium grown, light, with little fault | 6¼ | „ | 7 |
| O.F.S. grassveld grease, short, faulty, and wasty | 5½ | „ | 6¼ |
| O.F.S. Karroo grown, long and well-conditioned | 6¾ | „ | 7½ |
| O.F.S. medium grown, light, with little fault | 6 | „ | 7 |
| O.F.S. short, faulty, and wasty | 5½ | „ | 6 |

*Mohair.*—This article is now arriving freely and during the month a considerable volume of business has been done, chiefly in winter kids hair.

Early in the month prices rose from 11¼d. to 11¾d. for winter hair, whilst a fortnight ago 12d. was paid for best descriptions. During the past few days, however, prices have receded, and the best procurable to-day is 11½d.

At the moment there is a mark-time feeling in the market, as most buyers have secured considerable quantities and are now desirous of waiting before operating further.

Winter kids, after reaching 19½d. and up to 20d. for extra super parcels, are now in sympathy with winter hair—there being no activity—and what is offered is most carefully selected.

The stock of summer firsts is being gradually reduced; the principal sale of this description—about 200 bales—was made by ourselves at full prices.

The following are current values of:—

| | d. | | d. | | d. | | d. |
|---|---|---|---|---|---|---|---|
| Super summer kids | 25 | to | 26 | Seconds and grey | 8½ | to | 9½ |
| Good to super summer kids | 22 | „ | 24 | Thirds | 6 | „ | 7½ |
| Mixed kids | 16 | „ | 20 | Winter kids, special clips (nominal) | 17 | „ | 20 |
| Super firsts | 13 | „ | 14 | Winter kids, good ordinary (nominal) | 14 | „ | 16 |
| Mixed firsts | 12½ | „ | 12¾ | Winter mohair (nominal) | 11¼ | „ | 11¾ |
| Superfine long blue O.F.S. hair | 13½ | „ | 14¾ | Basuto mohair | 11¾ | „ | 12½ |
| Snperfine long blue O.F.S. kids | 20 | „ | 27 | Basuto mohair, grey | 8 | „ | 10 |
| Mixed O.F.S. mohair (average) | 12 | „ | 13 | | | | |
| Mixed O.F.S. mohair, very mixed | 10 | „ | 10½ | | | | |

*Skins.*—The following are the prices we obtained for the several descriptions this week:—Sheepskins, 7¼d. per lb.; damaged, 6¼d. per lb. Pelts, 5d. per lb.; damaged, 4d. per lb. Hair Capes, 3s. 2d. each; sundried, 2s. 2d. each; cut, 1s. each; damaged, 9d. each. Coarse wools, 6⅞d. per lb.; damaged, 4¾d. per lb. Goat, 13¼d. per lb.; heavy, 11d. per lb.; sundried, 11½d. per lb.; damaged, 6¾d. per lb. Bastards, 11½d. per lb.; damaged, 6d. per lb. Angora, 8¾d. per lb.; sundried and heavy, 7¾d. per lb.; shorn, 6¾d. per lb.; damaged, 4¾d. per lb. Johannesburg sheep, 5d.; damaged sheep, 2½d. Pelts, 2¼d. Goat, 10d.: damaged, 5d. Angora, 6½d.; damaged, 2d. per lb.

A large quantity of sheepskins are being received by us in a very seedy condition. Buyers will only purchase these at the price of damaged skins.

*Hides.*—Sundried, 13⅝d.; damaged, 12⅝d.; salted, 12⅝d.; damaged, 11⅝d. per lb.

*Horns.*—3½d. each all round.

## EAST LONDON.

The Produce Department of Messrs. Malcomess & Co., Ltd., write as follows under date 30th October, 1913:—

Our last letter dated 29th ult. reported on the opening of the London sales. During the second week of the fifth series of London Colonial wool sales cable news informed us that prices were unchanged for all grease wo ls. snow-whites slightly lower again, being only ½d. higher as compared with a full 1d. higher during the first week; and the series finally closed with

| | |
|---|---|
| Super long grease and short grease | Unchanged. |
| Snow-whites | Weaker. |
| Long heavy combings | Par to 5 per cent. lower. |

35,000 bales Australians }
2,000 bales Capes } being held over for next series.

As far as the future is concerned, it is expected that the prices will be maintained for the sixth series commencing at the end of November. What happens early in the new year is at present very uncertain. Possibly prices may be a bit weaker then.

On the *Continental markets* there has been a fair business doing, and buyers seem to have come out from Europe with fair orders in their pockets—judging by the activity in the local market.

*Bradford* buyers are not so active as the French and German trade, and prices are if anything a shade under last month's quotations. 28-28¼d. is about the outside price obtainable.

In our *local market* the public auctions have once again been started, and extensive business has already been done The wool is coming in large quantities now, and great keenness has been displayed amongst buyers to secure early lots. In order to do this they have been compelled to pay very high prices, and we do not think things can continue on the same high level.

Transkei grease has benefited by the rains that have fallen up country, and many of the wools are coming down clean and light. Some immense prices—up to 9⅝d. has been paid—will lead other traders astray, and we must warn our friends not to expect that everything will go to that level because a few early lots that were exceptionally light fetched this price.

Short wools from up-country districts fetched very good value, and although we do not wish to appear pessimistic we do not think these extreme values can continue for long. When short fine wools are more plentiful and first orders have been filled, a more reasonable level is likely to be found. Manufacturers have contracted for military cloths and now want the wool for the material. When these have fulfilled their requirements we think the easier rates will come, as prices are really about five per cent. too high for dealers.

Long wools are in fair demand, and wool of light condition and full length command full prices.

| | | | | |
|---|---|---|---|---|
| First sale on 18th inst.: | 540 offered, | 380 sold ; | transactions for week | 1200. |
| Second „ 27th „ | 1750 „ | 1100 „ | „ „ | 2 00. |

And a fair weight of wool has changed hands since then, so that the total for the month will come to over 4000 bales.

We quote:—

| | |
|---|---|
| Transkeis—good, clean, light lots | 8¾d. to 9¼d. |
| Transkeis—average lots | 8d. „ 8½d. |
| Basutos—good, average lots | 6¾d. „ 7½d. |
| Basutos—earthy, heavier | 6½d. „ 6¾d. |
| Super long Kaffrarian farmers | 9d. „ 11½d. |
| Super short Kaffrarian farmers | 8d. „ 10½d. |
| Super long well-conditioned grassveld | 7d. „ 10d. |
| Super short well-conditioned grassveld | 6½d. to 9d. |
| Short faulty grease | 5d. „ 7½d. |
| Coarse and coloured grease, good, average | 6d. „ 6¾d. |
| Coarse and coloured grease, kempy | 5d. „ 6d. |

*Mohair.*—The mohair sorters' strike is in course of settlement, and the men will probably go back to work on the old terms, so that nothing will have been gained. There has not been any consequent rise in the prices as yet, but there has been a little more business. On this side, however, there has been a distinctly quiet period. Both in "the Bay" and at this port there is little doing and some buyers have had their limits reduced. We quote:—

| | |
|---|---|
| Very best long blue mohair, free from kemp | 13d. to 13½d. |
| Good long blue mohair, slightly kempy | 12d. „ 12½d. |
| Superior Herschel mohair | 12d. „ 12½d. |
| Superior Basuto mohair | 11¾d. „ 12d. |
| Average Basuto mohair | 9½d „ 10d. |
| Best winter hair | 11¼d. „ 11¾d. |
| Average winter hair | 10½d. „ 11¼d. |
| Genuine winter kids | 14d. „ 15½d. |
| Coarse and coloured mohair | 5d. „ 6d. |

*Sundry Produce.*—Several lines have again advanced, and we quote as follows:—

| | | | |
|---|---|---|---|
| Sundried hides | 13¼d. to 13½d. | Goatskins | 13d. |
| Dry-salted hides | 12¼d. „ 12½d. | Angora skins | 8½d. |
| Sheepskins—1st quality | 7d. | Bastards | 10½d. to 11d. |
| „ C. and C. skins | 5¾d. „ 6¼d. | Damaged | 5d. to 6d. each. |
| „ Pelts | 4¾d. | Horns, according to size and quality | 2d. to 3d. each. |
| „ Transkei parcels | 5d. „ 5¼d | | |

## DURBAN.

Messrs. Reid & Acutt's Wool Mart, Ltd., Esplanade, Durban, report as follows under date 28th October, 1913:—

*Wool.*—The month just closing has witnessed the real opening of our selling season here, the new clip having begun to come to hand in fair quantities; in fact on the sales this week it is estimated that some 5000 bales of wool and mohair will be catalogued

The wool season has opened with the market in a very strong and healthy condition, competition on our auctions being brisk and animated, and practically everything offered has been moved off to the satisfaction of sellers.

As is frequently the case at the immediate commencement of the season, the earliest arrivals catalogued some weeks ago commanded somewhat enhanced figures, this being largely due to the fact that buyers are generally desirous of securing immediately representative parcels of the new wools, in order to be furnished with reports from their mills as soon as possible.

As supplies became larger each week during the past month, it was evident that this enhanced scale of values was not being maintained: in fact, as was expected, when buyers came to face fairly large catalogues, a much more discriminating tone was exhibited, and heavy-conditioned wasty wools have recently been a shade easier.

On the other hand, however, light-conditioned wools, particularly if of sound, well-grown staple, are in keen demand at very excellent rates, and there seems every likelihood of this healthy tone continuing.

We are pleased at again having to chronicle the increasing number of carefully skirted, well got up farmers' clips which are reaching us. Needless to say, such wools are always in demand, and on our sales we have been able to make prices which have been most encouraging to growers. For example, Free State wools have fetched from 9½d. to 10½d., and Transvaal wools up to 10¾d. per lb.

The Natal Midlands wools have not yet reached market in any quantity, but for one nice parcel we made 11¼d. last week.

*Mohair.*—Our mohair sales have also been characterized by a most vigorous inquiry, the demand being general, and prices all round are fully maintained. For one nice parcel of kids' hair from the Free State we obtained the very satisfactory figure of 20d. per lb.

*Coarse and coloured* is now selling at very high figures indeed, as will be seen from the appended quotations.

*Hides, Skins, Horns, etc.*—We have to report this market as being strong and active with a brisk demand, and during the month prices have improved appreciably.

*Wattle Bark* continues firm.

# Agricultural Show Dates, 1914.

***Secretaries of Societies which propose holding shows during 1914, the dates of which do not appear in the following list, are invited to send particulars at the earliest opportunity.***

CAPE PROVINCE.

Paarl.—Thursday, 29th January.
Stellenbosch.—Thursday, 5th February.
Robertson.—Tuesday and Wednesday, 10th and 11th February.
Britstown.—Wednesday, 11th February.
Worcester.—Thursday and Friday, 12th and 13th February.
Caledon.—Tuesday and Wednesday, 17th and 18th February.
Queenstown.—Wednesday and Thursday, 18th and 19th February.
Beaufort West.—Wednesday and Thursday, 18th and 19th February.
Ceres.—Thursday, 19th February.
Wodehouse.—Tuesday and Wednesday, 24th and 25th February.
Rosebank.—Tuesday to Friday, 24th to 27th February.
Cathcart.—Tuesday, 24th February.
Malmesbury.—Wednesday, 19th February.
Graaff-Reinet.—Wednesday and Thursday, 25th and 26th February.

CAPE PROVINCE—(*continued*).

Kingwilliamstown.—Thursday to Saturday, 26th to 28th February.
Middelburg.—Monday to Wednesday, 2nd to 4th March.
Barkly East.—Tuesday 3rd March.
East London.—Thursday and Friday, 5th and 6th March.
Cradock.—Thursday and Friday, 5th and 6th March.
Molteno.—Tuesday and Wednesday, 10th and 11th March.
Somer et East.—Tuesday and Wednesday, 10th and 11th March.
George.—Wednesday, 11th March.
Aliwal North.—Thursday and Friday, 12th and 13th March.
Grahamstown.—Thursday and Friday, 12th and 13th March.
Humansdorp.—Thursday and Friday, 12th and 13th March.
Port Elizabeth.—Tuesday to Friday, 17th to 20th March.
Kimberley.—Tuesday to Friday, 24th to 27th March.
Oudtshoorn.—Wednesday and Thursday, 15th and 16th April.

ORANGE FREE STATE PROVINCE.

Rouxville.—Wednesday and Thursday, 18th and 19th February.
Philippolis.—Wednesday and Thursday, 18th and 19th March.
Wepener.—Wednesday and Thursday, 25th and 26th February.
Ladybrand.—Wednesday and Thursday, 10th and 11th March.
Smithfield.—Tuesday and Wednesday, 3rd and 4th March.
Thaba 'Nchu.—Tuesday and Wednesday, 3rd and 4th March.
Senekal.—Tuesday and Wednesday, 3rd and 4th March
Vrede.—Tuesday and Wednesday, 3rd and 4th March.
Hoopstad.—Tuesday and Wednesday, 3rd and 4th March.
Jagersfontein.—Tuesday and Wednesday, 3rd and 4th March.
Fauresmith.—Tuesday and Wednesday, 10th and 11th March.
Bethlehem.—Tuesday and Wednesday, 10th and 11th March.
Heilbron.—Tuesday and Wednesday, 10th and 11th March.
Harrismith.—Wednesday and Thursday, 18th and 19th March.
Boshof.—Wednesday and Thursday, 18th and 19th March.
Clocolan.—Wednesday and Thursday, 18th and 19th March.
Frankfort.—Wednesday and Thursday, 18th and 19th March.
Lindley.—Wednesday and Thursday, 18th and 19th March.
Kroonstad.—Wednesday and Thursday, 25th and 26th March.
Winburg.—Wednesday and Thursday, 25th and 26th March.
Edenburg. Wednesday and Thursday, 25th and 26th March.
Ficksburg.—Wednesday and Thursday, 25th and 26th March.
Bloemfontein.—Tuesday to Friday, 31st March to 3rd April.

TRANSVAAL.

Middelburg.—Monday, 2nd February.
Ermelo.—Thursday and Friday, 5th and 6th March.
Standerton.—Wednesday and Thursday, 25th and 26th March.
Carolina.—Wednesday, 25th March.
Heidelberg.—Tuesday and Wednesday, 7th and 8th April.
Witwatersrand.—Wednesday to Saturday 15th to 18th April.
Potchefstroom.—Wednesday and Thursday, 22nd and 23rd April.
Nylstroom.—Friday, 15th May.
Pietersburg.—Thursday and Friday, 11th, and 12 h June.
South Magaliesburg.—Wednesday, 8th July.

OTHER SHOWS.

Polela (Natal).—Friday, 6th February.

# Current Market Rates of Agricultural Produce and Stock.

The following TABLE OF CURRENT MARKET RATES OF AGRICULTURAL PRODUCE AND LIVE STOCK on Saturday, 1st Nov., 1913, ruling at the several Centres named, is published for general information.

| Centre. | A. Wheat per 100 lb. | B. Wheat Flour per 100 lb. | C. Boer Meal per 100 lb. | D. Mealies per 100 lb. | E. Mealie Meal per 100 lb. | F. Barley per 100 lb. | G. Oats per 100 lb. | H. Oat-hay per 100 lb. | J. Lucerne Hay per 100 lb. | K. Potatoes per 100 lb. | L. Tobacco (Boer Roll) per lb. | M. Beef per lb. | N. Mutton per lb. | O. Fresh Butter per lb. | P. Eggs per dozen. | Q. Cattle (Slaughter). | R. Sheep (Slaughter). | S. Pigs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Cape Province:* | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | £ s. d. | s. d. | £ s. d. |
| Aliwal North ... | 12 6 | 22 6 | 15 6 | 7 6 | 9 0 | 8 0 | 9 6 | 7 6 | 11 6 | 9 6 | 1 0 | 0 6 | 0 5 | 2 0 | 1 3 | 10 10 0 | 15 0 | *2 10 0 |
| Beaufort West ... | 13 0 | 17 6 | 12 6 | 6 6 | 8 0 | 11 0 | 7 6 | 4 6 | 6 0 | 12 0 | 1 0 | 0 4 | 0 5½ | 1 4½ | 1 0 | 13 0 0 | 14 0 | 5 0 0 |
| Capetown ... | 6 3 | — | — | — | — | 8 0 | 6 6 | 4 0 | 5 6 | 10 8 | ‡0 5½ | — | — | 1 3 | 1 3 | — | — | — |
| East London ... | 9 0 | 18 0 | 29 0 | 6 6 | 14 0 | 3 6 | 8 6 | 6 0 | 4 0 | 14 0 | 1 0 | 0 5 | 0 6 | 2 0 | 1 0 | 11 0 0 | 17 0 | 1 7 0 |
| Grahamstown ... | 11 6 | — | — | 7 6 | — | 7 6 | 7 0 | 7 6 | 3 9 | 13 6 | 0 9¼ | 0 6 | 0 6 | 1 4½ | 1 0 | — | — | — |
| Kimberley ... | 12 0 | 15 0 | 4 6 | 5 9 | 7 0 | 9 0 | 6 9 | 5 3 | 5 0 | 12 0 | 0 7 | 0 6 | 0 5 | 1 4 | 1 3 | 14 0 0 | 15 0 | 3½d. p. lb. |
| Kingwilliamstown | 10 0 | 18 0 | 13 0 | 5 3 | 6 6 | 9 0 | 8 0 | 6 6 | 5 0 | 10 6 | 0 8 | 0 6 | 0 6 | 1 4 | 0 11 | 13 10 0 | 30 0 | 3d. " |
| Port Elizabeth ... | 10 0 | — | — | 7 0 | — | 7 0 | 7 6 | 6 0 | — | 10 6 | — | 0 6 | 0 6 | 1 5 | 1 2 | — | — | 2 10 0 |
| Queenstown ... | 11 0 | 16 6 | 14 0 | 6 6 | 10 0 | 9 0 | 9 6 | 5 6 | 6 6 | 10 0 | 0 10 | — | 0 4 | 2 6 | 1 0 | — | — | — |
| *Natal:* | | | | | | | | | | | | | | | | | | |
| Durban ... | — | — | — | 6 6 | — | — | — | — | — | 11 6 | — | 0 4 | 0 5 | 1 5 | 1 4 | — | — | — |
| Pietermaritzburg | 12 0 | — | — | 5 9 | — | 12 0 | 9 0 | 4 0 | 5 0 | 12 0 | 0 4 | 0 5 | 0 6 | 1 4 | 1 0 | — | — | — |
| *Transvaal:* | | | | | | | | | | | | | | | | | | |
| Pretoria ... | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Johannesburg ... | 12 0 | — | 12 6† | — | 6 3 | 9 0 | 7 8 | 5 6 | 5 6 | 15 8 | 0 1¼ | — | — | 0 11 | 1 0 | — | — | — |
| *Orange Free State:* | | | | | | | | | | | | | | | | | | |
| Bloemfontein ... | 13 0 | — | 15 0 | 5 0 | 7 0 | — | 5 0 | 4 9 | 6 6 | 10 0 | — | 0 6 | 0 7 | 1 9 | 1 0 | — | — | — |
| Harrismith ... | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

* Average, £2 to £3. † Sifted, White, 6s. 3d, Yellow, 4s. 6d. ‡ Average 4d. to 7d.

# The Weather.

By C. STEWART, B.Sc., Chief Meteorologist, Department of Irrigation.

THE mean air temperature over the Union during the month of September was about half a degree below the normal. The days were generally cooler than usual, and the nights slightly warmer.

The rainfall was generally satisfactory, especially in the south-east and centre of the Cape Province, where the normals were considerably exceeded. Rains were more or less general at about the middle of the month. In the south-east of the Cape some snow fell on the 2nd; and on the 29th and 30th a heavy snowstorm visited the northern borders and north-east of the Cape, the northern and east central Karroo, Kaffraria, and the Bethulie, Ficksburg, and Rouxville Districts of the Orange Free State. In the vicinity of Richmond, the snow was reported as having an average depth of two feet; in the District of Graaff-Reinet it lay one foot thick, and at Dordrecht seven inches.. The year's precipitation (from 1st January) is now in excess of the normal in Natal, the eastern half of the Cape Province, and within a belt extending from the north-east to the south-west of the Transvaal. Over all other parts of the Union a deficit still exists.

### DECEMBER WEATHER CHARACTERISTICS.

The south of the Cape Province now joins the western and south-western districts in a diminishing rainfall, but with these exceptions there is an increasing tendency throughout the Union. Swaziland, with about 6·5 inches. is now the venue of the heaviest precipitation, and then Zululand with 5·5 inches; the Transvaal, Basutoland, and Natal with 5·0 inches; Kaffraria with 4·5 inches; the south-east of the Cape with 3·5 inches; the Orange Free State and north-east of the Cape with 3·0 inches; the northern border of the Cape, and the northern and east central Karroo with 2·0 inches; the Peninsula with 1·0 inch, and the remainder of the Union with less than an inch. The period of minimum rainfall is now reached on the southern Karroo. Thunderstorms, accompanied by hail, are now of frequent occurrence, especially on the high veld, where they are responsible for most of the precipitation.

The highest mean daily temperature is still experienced over the northern borders of the Cape Province, where the normal now reaches 77 degrees. A mean temperature of 74 degrees may be anticipated in Natal; and in the Orange Free State 71 degrees; over the eastern Transvaal, the east central Karroo, and the south-east of the Cape 70 degrees; over the Transvaal high veld, along the western and south-western coastal districts, and over the northern and central Karroo 69 degrees; over the southern Karroo and along the south coast 67 degrees, and on the Peninsula 66 degrees.

In the Transvaal the prevailing winds are from a northerly direction, and in the Cape from a north-north-westerly over the north, and from a north-easterly and south-westerly over the south-east.

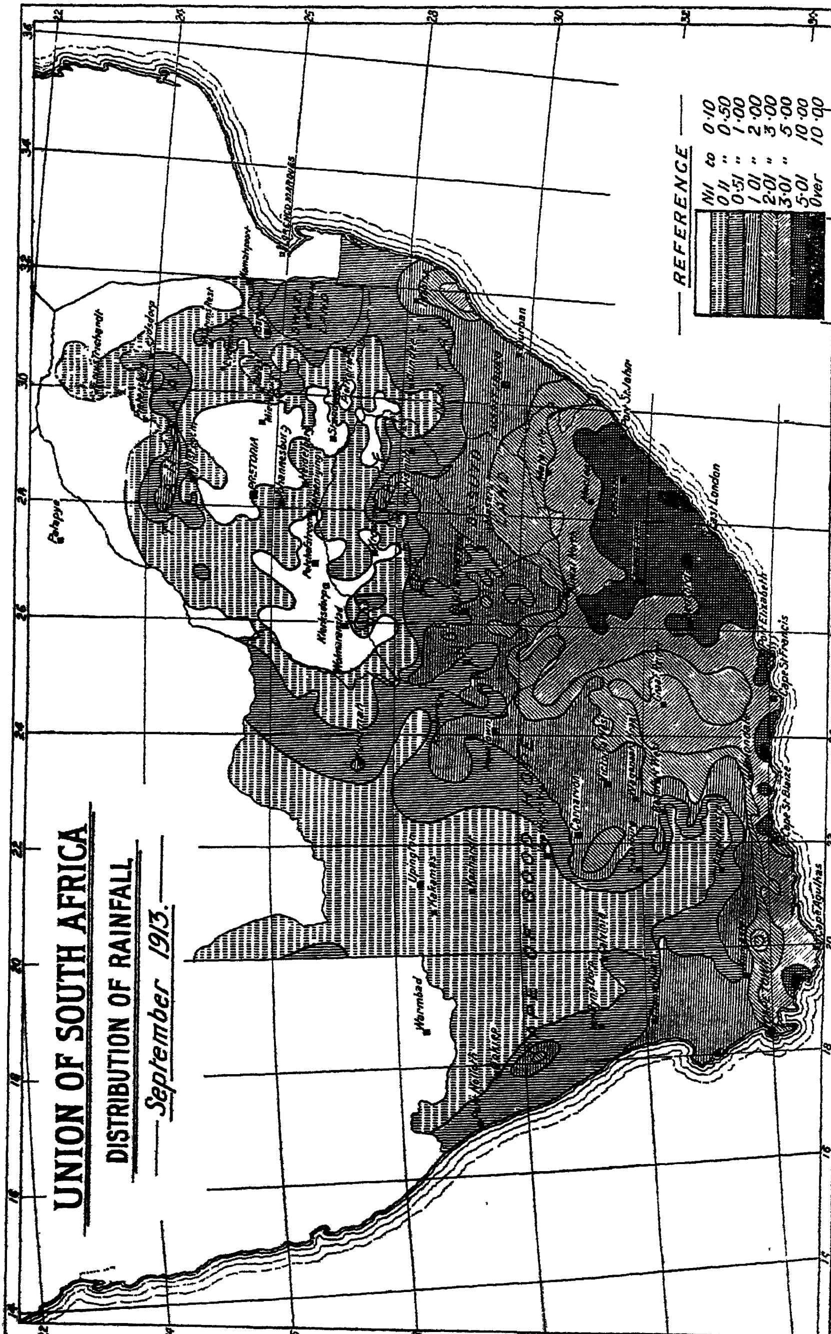
In the Transvaal the hours of bright sunshine should be about 60 per cent. of the total number possible, and in the Cape about 78 per cent. over the northern borders, 47 per cent. over the south-east, and 70 per cent. over the south-west.

OBSERVATIONS OF TEMPERATURES (FROM SELF-REGISTERING THERMOMETERS IN THERMOMETER SCREENS)—SEPTEMBER, 1913.

| Place. | Observer. | Month—September, 1913: Mean Max. | Mean Min. | Monthly Temperature. | Normal Monthly Temperature. | Difference from Normal. | Extremes: Highest. | Date. | Lowest. | Date. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | ° | ° | ° | ° | | ° | |
| *Transvaal*—Louis Trichardt ... | S.A. Riflemen ... | 78·3 | 53·4 | 65·9 | 66·0 | —0·1 | 90·0 | 16th & 29th | 40·0 | 6th. |
| Pietersburg ... ... | W. Frankleyne ... | 77·9 | 48·0 | 63·0 | 62·8 | +0·4 | 88·0 | 28th | 36·0 | 3rd. |
| Zeerust ... ... | H. Dietrich, J.P. ... | 77·0 | 49·6 | 63·3 | 63·8 | —0·5 | 89·4 | 25th | 36·0 | 3rd. |
| Pretoria (Arcadia) ... | J. Lyall Soutter ... | 78·8 | 49·0 | 63·9 | 63·4 | +0·5 | 91·0 | 28th | 37·7 | 4th. |
| Mbabane (Swaziland). | Swaziland Police ... | 70·1 | 47·5 | 58·8 | 61·2 | —2·4 | 85·4 | 24th | 36·0 | 4th. |
| Johannesburg (Obser.) | Staff ... ... | 69·8 | 46·7 | 58·3 | 59·1 | —0·8 | 81·2 | 25th | 30·0 | 4th. |
| Potchefstroom ... | J. R. Stenning ... | 77·9 | 45·0 | 61·5 | 61·1 | +0·4 | 89·8 | 25th | 31·1 | 3rd. |
| Komatipoort ... ... | H. J. Evans ... | 85·5 | 57·2 | 71·3 | 72·7 | —1·4 | 99·5 | 28th | 38·0 | 6th. |
| *Free State*—Bloemfontein ... ... | J. Arndt ... ... | 70·5 | 45·8 | 58·2 | 59·1 | —0·9 | 83·9 | 27th | 29·8 | 3rd. |
| Lindley ... ... | J. Oats ... ... | 71·5 | 42·6 | 57·1 | 59·0 | —1·9 | 83·5 | 26th | 29·0 | 30th. |
| Harrismith ... ... | J. B. Patterson ... | 67·4 | 41·5 | 54·5 | 54·6 | —0·1 | 79·0 | 25th | 23·0 | 4th. |
| *Natal*—Durban ... ... | Capt. Black ... | 68·3 | 61·5 | 64·9 | — | — | 76·0 | 27th | 51·0 | 3rd. |
| Maritzburg ... ... | Govt. Asylum ... | 80·7 | 49·0 | 64·9 | 65·2 | —0·3 | 100·0 | 26th & 27th | 30·0 | 5th. |
| Dundee ... ... | T. Kenny ... ... | 77·8 | 48·8 | 63·3 | 62·8 | +0·5 | 89·0 | 24th & 28th | 32·0 | 3rd. |
| Hlabisa ... ... | J. Swarbrick ... | 77·4 | 57·5 | 67·5 | — | — | 92·0 | 28th | 47·0 | 3rd. |
| *Cape*—Kuruman ... ... | G. Bean ... ... | 74·2 | 41·5 | 58·0 | — | — | 87·5 | 25th | 28·0 | 2nd & 3rd. |
| O'okiep ... ... | G. Crofts ... ... | 68·3 | 45·5 | 56·9 | 58·8 | —1·9 | 87·0 | 25th | 35·0 | 29th. |
| Hopetown ... ... | C. B. Scott ... ... | 72·5 | 45·5 | 59·0 | 60·1 | —1·1 | 89·6 | 26th | 33·2 | 3rd. |
| Aliwal North ... ... | A. Brown ... ... | 71·0 | 41·5 | 56·3 | 56·7 | —0·4 | 85·0 | 26th & 27th | 25·5 | 4th. |
| Kokstad ... ... | H. D. Coyte ... | 68·9 | 42·2 | 55·5 | 56·8 | —1·3 | 87·0 | 27th | 25·2 | 4th. |
| Queenstown ... ... | H. Holley ... ... | 68·5 | 45·4 | 57·0 | 58·2 | —1·2 | 87·0 | 26th & 27th | 28·0 | 4th. |
| Bedford ... ... | T. C. Hall ... ... | 69·1 | 47·4 | 58·2 | 58·6 | —0·4 | 92·0 | 26th | 32·0 | 4th. |
| East London ... ... | M. G. Grogan ... | 67·1 | 55·1 | 61·1 | 61·8 | —0·7 | 78·0 | 27th | 48·0 | 3rd. |
| Amalienstein ... ... | Rev. Carl Prozesky | 72·2 | 44·6 | 58·4 | 59·3 | —0·9 | 91·0 | 9th | 33·0 | 5th. |
| Groot Drakenstein ... | Lionel Baker ... | 69·0 | 47·3 | 58·1 | 58·3 | —0·2 | 86·8 | 9th | 37·9 | 12th. |
| Capetown (Observatory) | The Staff ... ... | 65·0 | 49·8 | 57·4 | 57·0 | +0·4 | 76·8 | 16th | 39·5 | 11th. |
| Wynberg ... ... | Sister Mary Imelda | 67·5 | 47·2 | 57·4 | 58·2 | —0·8 | 82·0 | 9th | 40·5 | 12th. |
| Mossel Bay ... ... | G. Draper ... ... | 64·2 | 48·3 | 56·3 | 58·4 | —2·1 | 72·0 | 21st | 43·0 | 12th, 13th, & 30th. |
| Port Elizabeth ... | P. E. Morgan ... | 65·3 | 52·1 | 58·7 | 59·7 | —1·0 | 74·0 | 9th | 47·0 | 3rd. |

RAINFALL RETURN FOR SEPTEMBER, 1913.

| PLACE. | OBSERVER. | MONTH. | | | YEAR. | | |
|---|---|---|---|---|---|---|---|
| | | Sept., 1913. | Normal. | Difference from Normal. | From 1st Jan., 1913. | Normal. | Difference from Normal. |
| *Transvaal—* | | ins. | ins. | ins. | ins. | ins. | ins. |
| Komatipoort ... | H. J. Evans ... | 0·17 | 0·48 | —0·31 | 15·53 | 17·18 | —1·65 |
| Christiana ... | S. W. Davis ... | 0·41 | 0·71 | —0·30 | 15·08 | 13·56 | +2·52 |
| Pilgrims Rest ... | E. Elphinstone ... | 0·27 | 1·06 | —0·79 | 26·75 | 27·89 | —1·14 |
| Zeerust ... ... | H. Dietrich, J.P. | 0·13 | 0·35 | —0·22 | 14·87 | 15·99 | —1·12 |
| Middelburg ... | Dr. H. A. Spencer | 0·05 | 0·58 | —0·53 | 12·91 | 15·99 | —3·08 |
| Pretoria (Arcadia) | J. Lyall Soutter... | 0·13 | 0·40 | —0·27 | 18·86 | 17·76 | +1·10 |
| Standerton ... | A. von Backstrom | 0·18 | 0·78 | —0·60 | 17·22 | 18·08 | —0·86 |
| Pietpotgietersrust | S. A. M. R. ... | 0·92 | 0·42 | +0·50 | 18·20 | 14·30 | +3·90 |
| Johannesburg ... | Observatory Staff | 0·40 | 0·92 | —0·52 | 13·95 | 18·10 | —4·15 |
| Louis Trichardt ... | S. A. M. R. | 0·19 | 0·54 | —0·35 | 18·62 | 19·16 | —0·54 |
| Pietersburg ... | W. Frankleyne ... | 0·58 | 0·31 | +0·27 | 14·83 | 11·86 | +2·97 |
| Rooiberg ... ... | N. H. Munro ... | 0·61 | 0·32 | +0·29 | 12·89 | 14·91 | —2·02 |
| *Swaziland—* | | | | | | | |
| Mbabane... ... | Swaziland Police | 1·64 | 1·80 | —0·16 | 30·98 | 31·22 | —0·24 |
| *Natal—* | | | | | | | |
| Maritzburg ... | Govt. Asylum ... | 1·49 | 1·62 | —0·13 | 33·27 | 22·55 | +10·72 |
| Hlabisa ... ... | J. Swarbrick ... | 2·80 | 2·80 | — | 39·85 | 25·11 | +14·74 |
| Dundee ... ... | T. Kenny ... | 0·94 | 1·33 | —0·39 | 20·27 | 19·26 | +1·01 |
| Durban ... ... | Capt. Black ... | 1·91 | 3·35 | —1·44 | 47·11 | 26·15 | +20·96 |
| *Cape—* | | | | | | | |
| Mafeking ... | J. G. Levis ... | 0·51 | 0·67 | —0·16 | 12·97 | 13·78 | —0·81 |
| Vryburg ... | Gaoler ... | 0·19 | 0·15 | +0·04 | 12·36 | 20·01 | —7·65 |
| Kenhardt ... | A. E. Bowker ... | 0·37 | 0·13 | +0·24 | 2·58 | 4·56 | —1·98 |
| Griquatown ... | E. Hanstein ... | 1·32 | 0·35 | +0·97 | 14·03 | 11·10 | +2·93 |
| Prieska ... ... | R. A. Roberts ... | 0·56 | 0·29 | +0·27 | 8·50 | 8·00 | +0·50 |
| Kimberley ... | Gaoler ... | 0·64 | 0·91 | —0·27 | 12·82 | 13·12 | —0·30 |
| Hopetown ... | C. B. Scott ... | 2·28 | 0·40 | +1·88 | 10·70 | 10·31 | +0·39 |
| Clanwilliam ... | W. J. Downes ... | 0·48 | 0·92 | —0·44 | 8·36 | 7·44 | +0·92 |
| Van Rhynsdorp ... | T. J. Shaw ... | 0·69 | 0·62 | +0·07 | 5·07 | 5·49 | —0·42 |
| Calvinia ... | Gaoler ... | 0·20 | 0·54 | —0·34 | 5·03 | 6·79 | —1·76 |
| Fraserburg ... | P. J. Booyzen ... | 0·60 | 0·32 | +0·28 | 7·98 | 5·88 | +2·10 |
| Britstown ... | P. A. Myburgh ... | 1·59 | 0·25 | +1·34 | 10·24 | 8·61 | +1·63 |
| Carnarvon ... | J. Sullivan ... | 0·15 | 0·35 | —0·20 | 6·10 | 7·08 | —0·98 |
| Victoria West ... | N. van Rensburg | 1·36 | 0·50 | +0·86 | 10·68 | 8·58 | +2·10 |
| Murraysburg ... | A. Cameron ... | 1·32 | 0·39 | +0·93 | 8·36 | 9·03 | —0·67 |
| Philipstown ... | P.W. van Ingen-Kal | 3·24 | 0·50 | +2·74 | 12·81 | 10·93 | +1·88 |
| Hanover ... ... | B. Collette ... | 2·34 | 0·64 | +1·70 | 10·36 | 11·61 | -1·25 |
| Aliwal North ... | Gaoler ... | 2·85 | 1·03 | +1·82 | 13·54 | 18·39 | —4.85 |
| Queenstown ... | H. Holley ... | 6·11 | 1·01 | +5·10 | 21·47 | 17·22 | +4·25 |
| Kokstad ... | H. D. Coyte ... | 4·42 | 1·32 | +3·10 | 24·61 | 17·17 | +7·44 |
| Umtata ... | C. R. Hampson ... | 5·08 | 1·63 | +3·45 | 20·40 | 16·97 | +3·43 |
| Port St. Johns ... | F. W. Lloyd ... | 9·95 | 3·20 | +6·75 | 52·43 | 29·99 | +22.44 |
| Worcester ... | W. B. Sutton ... | 2·39 | 1.14 | +1·25 | 12·30 | 9·10 | +3·20 |
| Capetown Observ. | The Staff... ... | 1·96 | 2·50 | —0·54 | 19·23 | 23·10 | —3·87 |
| Wynberg ... | Sister Mary Imelda | 3·64 | 4·10 | —0·46 | 34·46 | 36·26 | —1·80 |
| Sutherland ... | Gaoler ... | 0·28 | 0·66 | —0·38 | 5·58 | 8·10 | —2·52 |
| Amalienstein ... | Rev. Carl Prozesky | 0·97 | 1·03 | —0·06 | 8·54 | 9·72 | —1·18 |
| Swellendam ... | H. Montgomery... | 4·63 | 2·84 | +1·79 | 20·48 | 24·28 | —3·80 |
| Mossel Bay ... | G. Draper ... | 1·99 | 1·50 | +0·49 | 11·60 | 12·94 | —1·34 |
| Beaufort West ... | J. E. Stevens ... | 1·70 | 0·50 | +1·20 | 10·20 | 6·29 | +3·91 |
| Uniondale ... | E. J. Stewart ... | 1·99 | 1·21 | +0·78 | 13·19 | 11·01 | +2·18 |
| Knysna ... ... | C. Wilding ... | 4·43 | 2·64 | +1·79 | 20·81 | 20·29 | +0·52 |
| Graaff-Reinet ... | J. Simpson ... | 3·04 | 1·12 | +1·92 | 15·89 | 11·75 | +4·14 |


UNION OF SOUTH AFRICA
DISTRIBUTION OF RAINFALL
September 1913.
REFERENCE
Nil to 0·10
0·11 .. 0·50
0·51 .. 1·00
1·01 .. 2·00
2·01 .. 3·00
3·01 .. 5·00
5·01 .. 10·00
Over 10·00
PRETORIA
Johannesburg
Durban
Port St Johns
East London
Port Elizabeth
Cape St Francis
Cape St Blaize
Cape Agulhas
Upington
Warmbad
Carnarvon
Palapye

| PLACE. | OBSERVER. | MONTH. Sept., 1913. | MONTH. Normal. | MONTH. Difference from Normal. | YEAR. From 1st Jan. 1913. | YEAR. Normal. | YEAR. Difference from Normal. |
|---|---|---|---|---|---|---|---|
| *Cape* (continued)— | | ins. | ins. | ins. | ins. | ins. | ins. |
| Steytlerville ... | P. R. de Wet ... | 2·29 | 0·80 | +1·49 | 13·61 | 6·45 | +7·16 |
| Port Elizabeth ... | P. E. Morgan ... | 5·19 | 2·13 | +3·06 | 19·86 | 14·88 | +4·98 |
| Bedford ... | T. C. Hall ... | 5·30 | 1·75 | +3·55 | 22·28 | 19·05 | +3·23 |
| East London ... | M. G. Grogan ... | 6·31 | 1·98 | +4·33 | 28·58 | 17·34 | +11·24 |
| Van Wyk's Vlei... | J. R. Morkel ... | 0·25 | 0·13 | +0·12 | 4·48 | 5·19 | —0·71 |
| *Orange Free State*— | | | | | | | |
| Harrismith ... | J. B. Patterson ... | 0·45 | 1·16 | —0·71 | 13·94 | 18·02 | —4·08 |
| Bloemfontein ... | J. Arndt ... ... | 1·25 | 0·71 | +0·54 | 12·79 | 16·19 | —3·40 |
| Lindley ... | J. Oates ... | 0·47 | 1·27 | —0·80 | 12·01 | 16·29 | —4·28 |

# Outbreaks of Animal Diseases.

THE following outbreaks of scheduled infectious and contagious animal diseases have occurred in the areas specified during the month ended 31st October, 1913.

C. E. GRAY,
*Principal Veterinary Surgeon (Union).*

CAPE PROVINCE

| DISEASE. | DISTRICT. | AREA OR NAME OF FARM. | Number of Deaths. | Number of Animals Affected. | Number of In-contacts. | Number of Animals Tested. | Number of Animals Reacted and Destroyed. | Number of Doubtful Reactors to be Retested. |
|---|---|---|---|---|---|---|---|---|
| Anthrax | Barkly West | Delpoorts Hope | 1 | — | Unknown. | — | — | — |
| | Herschel | Bensonvale Location | 1 | — | 16 | — | — | — |
| | Komgha | Farm Lots 44, 45, and 46 xiii/25 and 26 | 1 | — | 14 | — | — | — |
| | " | Farm Section 13 xiii/35 | 1 | — | 44 | — | — | — |
| | Mafeking | Hillgonhe | 1 | — | Unknown | — | — | — |
| | " | Hell's Gate | 1 | — | 180 | — | — | — |
| | Swellendam | Grootvadersbosch | 1 | — | Unknown | — | — | — |
| | Vryburg | Schaapplaats | 1 | — | 12 | — | — | — |
| East Coast Fever | Elliott | Erf No. 11, Gubenxa | 1 | — | Unknown. | — | — | — |
| Glanders | Cape | Diep River | — | Nil | — | 6 | 3 | — |
| | " | Capetown | — | 1 | — | 7 | 2 | — |
| | Kimberley | Posno Street | — | 1 | — | 9 | 2 | — |
| Equine Scabies | Cape | Capetown | — | 1 | — | — | — | — |
| Tuberculosis | Cape | Various | — | — | — | 327 | 12 | 3 |
| | Malmesbury | " | — | — | — | 46 | 1 | Nil |
| | Paarl | " | — | — | — | 11 | Nil | Nil |
| | Stellenbosch | " | — | — | — | 63 | 3 | Nil |

NATAL.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| East Coast Fever | Camperdown ... | Langhoop ... | 2 | — | 366 | — | — | — |
| " | Ngotshe ... | Pamhaan ... | Unknown. | — | Unknown. | — | — | — |
| Mange in Equines | " ... | Impendhle Location ... | 1 | 12 | 95 | — | — | — |
| " | Alfred ... | Harding Commonage, Lot 2 ... | — | 4 | 12 | — | — | — |
| Lymphangitis ... | Lower Tugela ... | Sinquasi ... | 1 | — | 35 | — | — | — |
| Glanders ... | Eshowe ... | Entumeni ... | — | — | — | 5 | 2 | — |

TRANSVAAL.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Anthrax ... | Potchefstroom ... | Machavie ... | 1 | — | 75 | 75 | — | — |
| | Pretoria ... | Blaauwgumfontein ... | 1 | — | 100 | — | — | — |
| | Potchefstroom ... | Rondavel No. 353... | 1 | — | 100 | — | — | — |
| | Heidelberg ... | Maraisdrift No. 4 ... | 1 | — | — | — | — | — |
| | Pietersburg ... | Vogelstruisvlakte No. 543 ... | 1 | — | 300 | — | — | — |
| | Krugersdorp ... | Rietfontein No. 48 ... | 1 | — | 49 | 49 | — | — |
| | Witwatersrand ... | Grootvlei No. 26 ... | 2 | — | 175 | — | — | — |
| | Potchefstroom ... | Welgeboom No 588 ... | 1 | — | 45 | — | — | — |
| | " ... | Warrenhill Gold Mine ... | Unknown. | — | 162 | — | — | — |
| | Standerton ... | Leeuwfontein No. 297 ... | 11 | — | 315 | — | — | — |
| | Witwatersrand ... | Driefontein No. 1 ... | 1 | — | 20 | — | — | — |
| | " ... | Benoni ... | 1 | — | 50 | — | — | — |
| | " ... | Klipfontein No. 6... | 1 | — | 12 | — | — | — |
| | Krugersdorp ... | Roodepoort ... | 1 | — | 11 | — | — | — |
| Mange in Equines | " ... | Durban Deep Gold Mine, Roodepoort ... | — | 1 | 30 | — | — | — |
| Swine Fever ... | " ... | Krugersdorp ... | — | 1 | 22 | — | — | — |
| Anthrax in Pigs... | Standerton ... | Leeuwfontein No. 297 ... | 11 | — | 20 | — | — | — |

Districts in Transvaal in which East Coast Fever is prevalent :—Barberton, Carolina, Lydenburg, Piet Retief, Pietersburg, Pretoria, Rustenburg, Wakkerstroom, and Zoutpansberg.

ORANGE FREE STATE.

| Disease. | District. | Area or Name of Farm. | Number of Deaths. | Number of Animals Affected. | Number of In-contacts. | Number of Animals Tested. | Number of Animals Reacted and Destroyed | Number of Doubtful Reactors to be Retested. |
|---|---|---|---|---|---|---|---|---|
| Anthrax ... | Heilbron ... ... | Steenpan ... ... ... ... ... ... ... | 2 | — | 100 | — | — | — |
| „ ... | Ficksburg ... ... | Dwarskloof and Kraanskloof combined ... ... | 4 | — | 215 | — | — | — |
| „ ... | Kroonstad ... ... | Nooitgedacht ... ... ... ... ... ... | 3 | — | 500 | — | — | — |
| „ ... | „ ... ... | Randfontein ... ... ... ... ... ... | 3 | — | 75 | — | — | — |

TRANSKEI.

| Disease. | District. | Area or Name of Farm. | Number of Deaths. | Number of Animals Affected. | Number of In-contacts. | Number of Animals Tested. | Number of Animals Reacted and Destroyed | Number of Doubtful Reactors to be Retested. |
|---|---|---|---|---|---|---|---|---|
| East Coast Fever | Mount Frere ... | Ngovolos Location ... ... ... ... ... | 4 | — | 17 | — | — | — |
| | „ ... | Jacksons „ ... ... ... ... ... | 132 | — | 56 | — | — | — |
| | „ ... | Zebokwenas „ ... ... ... ... ... | 1 | — | 38 | — | — | — |
| | Butterworth ... | Tgelenzwas „ ... ... ... ... ... | 6 | — | 355 | — | — | — |
| | „ ... | Madasses „ ... ... ... ... ... | 16 | — | 310 | — | — | — |
| | „ ... | Khedamas „ ... ... ... ... ... | — | — | — | — | — | — |
| | Mqmakwe ... | Solanis „ ... ... ... ... ... | 1 | — | 49 | — | — | — |
| | „ ... | Mkwas „ ... ... ... ... ... | 1 | — | 91 | — | — | — |
| | „ ... | Nobandas, Yapis, and Mavusos Location ... ... | 1 | — | 76 | — | — | — |
| | Xalanga ... ... | Cala Commonage ... ... ... ... ... ... | 1 | — | 585 | — | — | — |
| | Kentani ... ... | Fokotos and Boxos Location ... ... ... ... | — | — | — | — | — | — |
| Anthrax ... | „ ... ... | Simagas Location ... ... ... ... ... | — | — | — | — | — | — |
| | Nqmakwe ... ... | Mavusos „ ... ... ... ... ... | — | — | — | — | — | — |
| Glanders ... | Umtata ... ... | S.A.M.R. Camp ... ... ... ... ... ... | — | — | — | 9 | 1 | — |
| | Tabankulu ... ... | Tabankulu Village ... ... ... ... ... | — | — | — | 104 | 2 | — |
| | Nqmakwe ... ... | Nqmakwe „ ... ... ... ... ... ... | — | — | — | — | 2 | — |
| Lung-sickness ... | Engcobo ... ... | Bisley Sendolos Location ... ... ... ... | — | — | — | — | 1 | — |
| „ ... | „ ... ... | Engcobo Commonage ... ... ... ... ... | — | — | — | — | 1 | — |
| „ ... | „ ... ... | Poswayos Location ... ... ... ... ... | 1 | — | 71 | — | 2 | — |
| „ ... | Mqanduli ... ... | Situtzis ... ... ... ... ... ... ... | — | — | 155 | — | 1 | — |
| „ ... | „ ... ... | Sipendus ... ... ... ... ... ... ... | 1 | — | 46 | — | — | — |
| „ ... | Elliotdale ... ... | Stefanis Location ... ... ... ... ... ... | 1 | — | — | — | — | — |
| Mange ... | Tabankulu ... ... | Sigidis „ ... ... ... ... ... ... | — | 20 | — | — | — | — |

# Importation of Live Stock.

RETURN showing particulars of certain Pure-Bred Live Stock recently imported into the Union of South Africa.

| Stud-book No. or Name. | Breed and Stud-book in which Registered. | Sex. | Country of Origin. | Importer's Name and Address. |
|---|---|---|---|---|
| HORSES: | | | | |
| No. 7290 ... ... ... | Suffolk ... ... ... ... ... ... ... | Mare | U.K. | Fred. Ringer, Heilbron, O.F.S. (12/9/13). |
| "Lodi," No. 7423 ... ... | " ... ... ... ... ... ... ... | " | " | " " " |
| "Opinion" ... ... | Thoroughbred.—English Stud Book, vol. 22 ... ... | Stallion | " | H. L. du Toit, Zoutpan, P.O. Honey Nest Kloof (10/9/13). |
| "Fritz Haas" ... ... | " " " " " ... ... | " | " | " " " |
| Unnamed ... .. ... | " " " " vol. 21, p. 124 ... | " | " | " " " |
| "Capua" ... ... ... | " " " " vol. 21, p. 784 ... | " | " | " " " |
| No. 25 ... ... ... | " " " " ... ... ... | Mare | " | P. W. Day, St. George's Street, Capetown. (10/9/13). |
| No particulars ... ... | " " " " vol. 21, p. 898 ... | Stallion | " | Secretary, Agricultural Co-operative Union, Maritzburg (23/9/13). |
| No. 70 ... ... ... | " " " " vol. 21, p. 570 ... | " | " | A. Welch, Harrismith (17/9/13). |
| No 71 ... ... ... | " " " " vol. 21, p. 881 ... | " | " | " " |
| No particulars ... ... | " " " " vol. 21, p. 692 ... | " | " | B. Runciman, Durban (2/19/13). |
| " | " " " " vol. 21 ... ... | " | " | Chas. R. Stainer, Kroonstad, O.F.S. (2/9/13). |
| " | Welsh Pony.—Welsh Pony and Cob Society, vol. 13 ... | " | " | Whiley, Roderick, Bloemfontein (8/9/13). |
| " | " " " " " ... | " | " | " " " |
| "Moorston," No. 17,395 ... | Clydesdale.—Clydesdale Stud-book, vol. 35 ... ... | " | Scotland | E. G. C. Christian, Cradock, C.P. (22/9/13). |
| No. 34,406 ... ... ... | " Clydesdale Horse Society ... ... | Mare | U.K. | G. W. Young, Wanstead, New Amalfi, P.O. Franklin, E.G. (20/9/13). |
| No. 34,407 ... ... ... | " " " ... ... | " | " | " " " |
| No. 17,627 ... ... ... | " " " ... ... | Stallion | " | " " (17/9/13). |
| No. 2534 ... ... ... | Yorkshire Coach Horse Society ... ... ... ... ... | " | " | W. A. Bester, Reitz, O.F.S. (17/9/13). |
| No. 2538 ... ... ... | " " " ... ... ... ... | " | " | " " " |
| No. 2547 ... ... ... | " " " ... ... ... ... | " | " | " " " |
| No. 2548 ... ... ... | " " " ... ... ... ... | " | " | " " " |
| "Latest Triumph" ... | No particulars ... ... ... ... ... ... | Colt | Australia | S. M. Pierce, Heilbron (4/9/13). |

| Stud-book No. or Name. | Breed and Stud-book in which Registered. | Sex. | Country of Origin. | Importer's Name and Address. |
|---|---|---|---|---|
| **ASSES:** | | | | |
| 4 Animals ... ... ... | Spanish.—Catalonian ... ... ... ... ... | Jacks | Barcelona | C. A. Pope, Molteno (27/9/13). |
| **CATTLE:** | | | | |
| "Primly Freebooter," No. 4536 | South Devon.—South Devon Herd-book, vol. 13 p. 159 | Bull | England | Harry Archer, Graaff-Reinet (22/9/13) |
| "Primly Enid," No. 11,264 | " " " " vol. 13, p. 113 | Heifer | " | " " " |
| "Primly Electra," No. 11,259 | " " " " vol. 13, p. 112 | " | " | " " " |
| No particulars ... ... | " " " " vol. 14 ... | Bull | U.K. | Bourke Trust and Estate Co., Ltd., Pretoria (1/9/13). |
| No particulars (4 animals) | " " " " vol. 13 ... | Bulls | " | " " " |
| No particulars (3 animals) | " " " " vol. 13 ... | Cows | " | " " " |
| No. 4511 ... ... ... | " " " " ... ... ... | Bull | " | J. J. Boyce, Bethlehem (4/10/13). |
| Nos. 9178, 9784, 9785 ... | " " " " ... ... ... | Cows | " | " " " |
| No particulars ... ... | " " " " vol. 13 ... | Heifer | " | G. Webster, Balgowan, Natal (4/10/13). |
| " ... ... | " " " " vol. 13, p. 168 | Bull | " | " " " |
| No. 11,301 ... ... ... | South Devon.—South Devon Herd-book Society ... | Heifer | " | Thomson & Arnott, Highflats (26/9/13). |
| No. 4484 ... ... ... | " " " " " ... | Bull | " | " " " |
| Nos. 9694, 9348 ... ... | " " " " " ... | Cows | " | " " " |
| No. 4532 ... ... ... | " " " " " ... | Bull | " | Jas. Ross, Reitz, Orange Free State (24/9/13). |
| No. 4370 ... ... ... | " " " " " vol. 74 | " | " | N. Maitland, Ermelo (17/9/13). |
| Nos. 9532, 10,374 ... ... | " " " " " vol. 12, [p. 101 & 238 | Heifers | " | P. L. Nightingale, Inyezane Halt, Zululand (5/9/13). |
| No. 4482 ... ... ... | " " " " " vol. 13 | Bull | " | " " " |
| "Rainbow Holly," No. 25,212 | Devon.—Devon Herd-book ... ... ... ... | Heifer | England | H. L. Southey, Waterfall, Steynsberg (22/9/13). |
| "Knowle Cowslip," No. 25,351 | " " " ... ... ... ... | " | " | " " " |
| "Highfield Jewel," No. 26,066 | " " " ... ... ... ... | " | " | " " " |

| | | | | |
|---|---|---|---|---|
| "Western Tulip," No. 26,088 | Devon.—Devon Herd-book ... ... ... ... | Heifer | England | H. L. Southey, Waterfall, Steynsberg (22/9/13). |
| "Court Limerock" ... | „ „ „ vol. 37 ... ... ... | Bull | „ | J. O. Southey, Varkenskop, Schoombie (22/9/13). |
| "Pound Curley XIV.," No. 25,359 | „ „ „ ... ... ... ... | Heifer | „ | „ „ „ |
| "Kingsford Duchess 6th," No. 23,965 | Devon.—Devon Cattle Breeders' Society ... ... | „ | „ | J. N. King, Tarkastad (24/9/13). |
| "Junket 7th," No. 25,458 | „ „ „ „ ... ... | „ | „ | „ „ „ |
| "Kingsford Tig Duchess 7th," No. 26,304 | „ „ „ „ ... ... | „ | „ | „ „ „ |
| "Tongswood Hero," No. 118,026 | Shorthorn.—Coates Herd-book, vol. 59, p. 456... ... | Bull | „ | R. P. Kingwill, Gordonville, Blauwwater Siding, Graaff-Reinet (13/9/13). |
| "Tongswood Belle 2nd" | „ „ „ vol. 58, p. 606... ... | Heifer | „ | „ „ „ |
| "Tongswood Laura" ... | „ „ „ vol. 58, p. 607... ... | „ | „ | „ „ „ |
| "Tongswood Nell 2nd" ... | „ „ „ vol. 58, p. 607... ... | „ | „ | „ „ „ |
| "Dale Pimpernel" ... | „ „ „ vol. 59, p. 128... ... | Bull | „ | Ronald Currie, Glenons, Grahamstown (25/9/13). |
| "Lichfield Duchess 15th" | „ „ „ vol. 58, p. 406... ... | Heifer | „ | J. G. Frost, Rockland, Waverley, Queenstown (25/9/13). |
| "Lichfield Duchess 13th" | „ „ „ vol. 58, p. 406... ... | „ | „ | „ „ „ |
| No particulars ... ... | „ „ „ vol. 58, p. 481... ... | „ | „ | Cooper & Nephews, East London (1/10/13). |
| „ ... ... | „ „ „ vol. 58, p. 777... ... | „ | „ | „ „ „ |
| "Cornish Maid 3rd" ... | Shorthorn.—Shorthorn Society ... ... ... ... | „ | U.K. | A. van Raelte, Bethlehem (4/10/13). |
| "Hayle Countess 6th" .. | „ „ „ ... ... ... ... | „ | „ | „ „ „ |
| "Hayle Dawn" ... ... | „ „ „ ... ... ... ... | „ | „ | „ „ „ |
| No. 115,816 ... ... | „ „ „ ... ... ... ... | Bull | „ | „ „ „ |
| No. 22,334 ... ... ... | „ „ „ ... ... ... ... | „ | „ | Holmes & Co., Club Arcade, Durban (29/9/13). |
| Nos. 22,446, 22,447, 22,448 | „ „ „ ... ... ... ... | Heifers | „ | „ „ „ |
| "Fancy Barrington" ... | „ „ „ ... ... ... ... | Heifer | „ | E. W. Evans, Creighton, Natal (26/9/13). |
| No. 117,222 ... ... | „ „ „ ... ... ... ... | Bull | „ | O. Hosking, Rosetta (25/9/13). |
| "Violet XV" ... ... | „ „ „ ... ... ... ... | Heifer | „ | „ „ |
| "Coronet 26" ... ... | „ „ „ ... ... ... ... | „ | „ | „ „ |
| "Daisy Princess" ... ... | „ „ „ ... ... ... ... | „ | „ | „ „ |
| "Oakfield Crages" ... | „ „ „ ... ... ... ... | „ | „ | „ „ |
| No. 11,701 ... ... ... | „ „ „ ... ... ... ... | Bull | „ | James Cole, Llewellyn, E.G. (25/9/13). |

| Stud-book No. or Name. | Breed and Stud-book in which Registered. | Sex. | Country of Origin. | Importer's Name and Address. |
|---|---|---|---|---|
| CATTLE (*contd.*) : | | | | |
| "Diamond Mint" ... ... | Shorthorn.—Shorthorn Society ... ... ... ... | Bull | U.K. | James Cole, Llewellyn, E.P. (25/9/13). |
| "Orange King" ... ... | " " " ... ... ... ... | " | " | " " " |
| "Eaton Prototype" ... | " " " ... ... ... ... | " | " | G. W. Young, Wanstead, New Amalfi, Franklin, E.G. (25/9/13). |
| "Eaton Protector" ... | " " " ... ... ... ... | " | " | " " " |
| "Viola" ... ... ... | " " " ... ... ... ... | Heifer | " | " " " |
| "Heather Bell 3rd" ... | " " " ... ... ... ... | " | " | " " " |
| No particulars (3 animals) | Shorthorn.—Shorthorn Society Coates Herd-book, vol. 59 | Heifers | " | Agric.Co-operative Union, Ltd., Maritzburg (1/9/13). |
| No particulars ... ... | " " " " vol 60 | Bull | " | " " " |
| " ... ... | Shorthorn.—Milking Shorthorn Cattle Stud-book of N.S Wales. | " | Australia | W. H. S. Bell, Heilbron (10/9/13) |
| "Acton Pansy IV.," No. 22,407 | Red Poll.—Red Poll Herd-book, vol. 28 ... ... | Heifer | England | Orpen & Son, Barkly East (20/9/13). |
| No particulars ... ... | Red Poll ... ... ... ... ... ... ... | Calf | " | " " " |
| "Acton Marigold B 11," No. 21,962 | Red Poll.—Red Poll Herd-book, vol. 27 ... ... | Cow | " | " " " |
| No particulars ... ... | Red Poll ... ... ... ... ... ... ... | Calf | " | " " " |
| "Markam David" ... | Red Poll.—Red Poll Herd-book, vol. 31 ... ... | Bull | " | " " " |
| Nos. 10,203, 10,406 ... | Red Poll.—Red Poll Cattle, S.S.B., vol. 28 ... ... | " | " | J. Henwood, Rosetta, Natal (2/9/13). |
| "Terling Forfeit," No. 2135 | Holstein.—British Holstein Cattle Society, vol. 2, p. 136 | " | " | F. A. Davidson, Barkly East (19/9/13). |
| Nos. 35,775, 35,787, 35,788, | Ayrshire.—Ayrshire Cattle Herd-book Society ... | Heifers | U.K. | Thomson & Arnott, Highflats (26/9/13). |
| No. 9623 ... ... ... | " " " " " ... | Bull | " | " " " |
| No. 35,793 ... ... ... | " " " " " ... | Cow | " | " " " |
| No. 33,869 ... ... ... | " " " " vol. 36 ... | Bull | " | C. G. Thompson, Holmdene, Transvaal (25/9/13). |
| Nos. 9729, 33,870, 33,878, 33,880 | " " " " " ... | Heifers | " | " " " " |
| No. 35,794 ... ... ... | " " " " vol. 37 ... | Heifer | " | G. W. Young, Wanstead, New Amalfi, P.O. Franklin, E.G. (25/9/13). |
| "Ashmoor Sleeping Beauty," No 22,424 | Suffolk ... ... ... ... ... ... ... | Cow | " | H. J. Quinn, Glen Siding, Bloemfontein (25/9/13). |

| | | | | |
|---|---|---|---|---|
| "Ashmoor Mavourine," No. 22,906 | Suffolk ... ... ... ... ... ... ... | Cow | U.K. | H. J. Quinn, Glen Siding, Bloemfontein (25/9/13). |
| "Ashmoor Princess Mary," No. 22,896 | „ ... ... ... ... ... ... ... | „ | „ | „ „ „ |
| "Ashmoor Diamond," No. 22,903 | „ ... ... ... ... ... ... ... | „ | „ | „ „ „ |
| **SHEEP:** | | | | |
| 50 animals ... ... ... | Shropshire.—Shropshire Sheep Breeders' Association... | Ewes | U.K. | Sir David Graaff (18/9/13). |
| 2 animals ... ... ... | „ „ „ „ „ ... | Rams | „ | „ „ |
| No particulars ... ... | Dorset Horn.—Dorset Horn Sheep Breeders' Association | „ | England | Martin & Co., Perseverance (22/9/13). |
| No particulars (10 animals) | „ „ „ „ | Ewes | „ | „ „ „ |
| No particulars ... ... | „ „ „ „ | Ram | U.K. | S. Bennett, Willow Grange, Natal (27/9/13). |
| No particulars (10 animals) | „ „ „ „ | Ewes | „ | „ „ „ |
| "Baron Nine Churches," I. to XII., Nos. 7867 to 7878 (12 animals) | Oxford Down.—Oxford Down Sheep Breeders' Association | Rams | England | C. B. Lovemore, Schoombie, Middelburg, C.P. (22/9/13). |
| No particulars (5 animals) | Merino (no particulars) ... ... ... ... ... | „ | Australia | W. T. Clark, Clark Siding (26/9/13). |
| No particulars ... ... | „ „ ... ... ... ... ... | „ | „ | G. Blaine, Ross, Amabele (26/9/13). |
| **PIGS:** | | | | |
| No particulars (2 animals) | Tamworth.—National Pig Breeders' Association ... | Sows | U.K. | Sir David Graaff (17/9/13). |
| No particulars ... ... | „ „ „ „ ... | Boar | „ | „ „ |
| No particulars (2 animals) | „ „ „ „ ... | Sows | „ | „ „ |
| No. 17,100 ... ... ... | Berkshire.—British Berkshire Society, vol. 30... ... | Sow | „ | „ „ |
| No. 17,110 ... ... ... | „ „ „ „ ... | Boar | „ | „ „ |
| No. 17,033 ... ... ... | „ „ „ „ ... | „ | „ | „ „ |
| "Eva Augustus II.," No. B.B., 16,705 | „ „ „ ... ... ... | Sow | „ | J. H. de Wet, Bird Street, Stellenbosch (2/9/13). |
| No. B.B., 17,093 ... ... | „ „ „ vol. 30... ... | „ | „ | G. W. Young, Wanstead, New Amalfi, P.O. Franklin, E.G. (22/9/13). |

# Farm Employment.

*NOTE.—This section is open to persons desiring to obtain employment on the land, and to farmers who require farm assistants. Notices are inserted in several succeeding issues; and advertisers are requested to advise the Editor as soon as their requirements are filled in order that their notices may be deleted.*

## SITUATIONS WANTED.

Position wanted on farm by youth 19 years of age. Four years' experience of mixed farming. Knowledge of Dutch and Kaffir.—L. NOBLE, 59 Pretoria Street, Troyeville, Johannesburg. [9]

Applicant, experienced and hard worker, age 22, wants good situation as manager of farm, or will run farm on shares. Two years' 2nd class diploma at College of Agriculture, Elsenberg; born in South Africa; accustomed to live stock farming from birth short course at Potchefstroom in July, 1913; will run suction gas and oil engines; experience in cattle, incubators, dairy, ostriches, sheep, poultry, crops, and fruit (vines, pears, apples), etc. —EUSTACE A. CROLL-JONES, Ravensworth, Claremont, Capetown. [9]

Applicant, English, aged 46, desires post on a fruit farm. Thoroughly understands fruit culture, having had many years of practical experience in California; is proficient in planting, pruning, and the general care of fruit trees, both deciduous and citrus. Terms to be arranged.—CHARLES E. REUSS, 5 Florence Villas, Orange Street, Capetown. [9]

Young Englishman, just arrived, desires post on farm or plantation. Excellent references, and prepared to work.—J. E ASHMEAD, Rocklands, Seapoint, Capetown. [9]

Applicant, aged 40, with knowledge of tobacco, cotton, citrus-growing, also general farming, desires employment. Salary required with percentage of crops. References.—C. A. FAIRLIE, 46 Esselen Street, Johannesburg. [9]

Applicant, age 28, desires employment on a farm. No experience in farming. Would like, if possible, a salary, and in return keep accounts, etc.—JAMES GOODALL, Rocklands, Beach Road, Sea Point, Capetown. [9]

Applicant, age 38, married, with six children, two eldest boys 14 and 15, desires position on farm or estate. Experienced in carpentry, wire work, fencing, upkeep of telephones and erection of lines. Good kit of tools. Used to supervising Kaffir and Indian labour. Twelve years' successful experience in poultry rearing.—C.A.T., 276 Bulwer Road, Durban. [9]

Active, well-educated young man, seeks appointment on agricultural and stock farm as learner. Not afraid of work. Can be useful in many ways besides farming.—ROSE, c/o Rayton Co-operative Store, Rayton, near Pretoria. [11]

Applicant, married, desires situation as farm manager, by up-to-date and experienced farmer, including the management of ostriches and cultivation of lucerne, agriculture in all branches, and all branches of stock farming.—"OXO," *Journal* Office, Pretoria. [11]

Wanted by a handy-man, age 40, married, fairly well educated, any position on a farm. Not afraid of work. Small salary, with piece of ground to work for himself, where there is a small house preferred. Natal Province.—MICK, c/o Mr. A. E. Nolan, P.O. Dundee. [11]

Energetic young man, 23 years of age, undergraduate Cape University, competent bookkeeper and secretary, seeks employment on farm where he can acquire practical farming knowledge. Best testimonials.—C.J.R., Box 1599, Johannesburg. [11]

Applicant, age 40, single, would like employment on farm. Ploughman, with knowledge of general farm work. Can do repairs such as blacksmithing, shoeing, wood-work, wagons, etc., also could drive steam or motor plough, including necessary repairs. Would go shares in mealie farming (or otherwise) with object of settling in South Africa.—R. HESELTINE, Box 97, Pilgrims Rest. [11]

Applicant, age 30, single, desires a situation as working manager or foreman on a fruit farm. Fifteen years' practical experience in pruning, grafting, budding, and laying out of orchards of citrus and deciduous fruits. Specially trained in packing of same for export or local trades, for which first prize was awarded at Grahamstown Show. Excellent references can be given.—S.S. Box 3036, Johannesburg. [11]

Situation wanted on farm by husband and wife. Former has had experience in farming in other countries; is also prepared to teach book-keeping. Latter can take charge of school or pupils, teach French, etc., in addition to ordinary school curriculum.—V. A. W., *Agricultural Journal* Office, Pretoria. [11]

South African, age 56, unmarried and bilingual, desires situation on a farm. Has had a wide experience in farming in South Africa, and is able to handle horses, ostriches, and live stock generally, and altogether to oversee the many duties to be carried out on a farm.—M. H. GREEFF, Poste Restante, Capetown. [11]

South African, age 25, seeks employment as farm manager. Holds diploma of Potchefstroom School of Agriculture. Not afraid of hard work. Willing to work for salary, or on share and salary basis.—H.M., Box 2664, Johannesburg. [11]

Student at Elsenburg Agricultural College (Cape), age 21 years, completing full course in December, desires suitable employment on a dairy and fruit farm, or on a general farm by preference Has matriculated; speaks English and Dutch; and has good references.—B. B. HEWAT, Elsenburg, Mulders Vlei, C.P. [11]

Single man, British, aged 33, with good education, seeks position with established farmer. Small salary or other suitable arrangement. Two years' general experience.—J. PACKMAN, Central Hotel, Vryburg. [11]

Young Colonial, age 20, healthy and strong, is desirous of getting on a farm up-country—Eastern Province or O.F.S. preferred—to learn cattle, sheep, and general farming. Speaks Dutch.—DONALD H. R. LYON, P O Constantia, C.P. [11]

German, age 21, single, who has had one year's training on the Agricultural Experiment Station at Bremen, Germany. and other farming experience, especially in connection with the management of cattle, is anxious to obtain employment on a farm in the Union—JOH. CREMER, "Penarth," St. John's Road, Sea Point, C.P.

## SITUATIONS VACANT.

The South African National Union have a number of applications from farmers in different parts of the Union who offer to take pupils on the condition that they are willing to serve a term of apprenticeship in exchange for board and lodging and instruction, with the prospect of a wage or interest afterwards. Young men who will go on to the land on these terms are invited to communicate with the Secretary, 20 Cullinan Buildings, Johannesburg. [9]

Wanted a practical man (single) to take over lands on shares, oxen and implements supplied, but not labour.—X.Y.Z., c/o Boyce & Co., Zeerust. [11]

Uncultivated piece of land offered to a person who is prepared to work it on his own account. Plenty of water. Suitable for early gardening. Five miles from market. Also another farm suitable for dry-land farming. Terms to be agreed upon.—P. F. TRICHARDT, Waterkloof, P.O. Rustenburg. [11]

Assistant required on a general farm. Testimonials wanted. Payment of 10 per cent. of all harvests, viz., cereal and stock. Board and lodging free. Write for further information to C. J. V. D. WESTHUIZEN, Vaalkrantz, P.O. Paardekraal, via Roodewal Station. [11]

# Egg-laying Competitions.

## NOTES AND FIGURES FOR SEPTEMBER.

## ROSEBANK EGG-LAYING COMPETITION.

## WESTERN PROVINCE AGRICULTURAL SOCIETY.

(*1st May*, 1913, *to 30th April*, 1914.)

RECORD FOR SEPTEMBER, 1913.

| Pen Number. | Owner. | Variety. | Record for Sept. | Total to 30th Sept. |
|---|---|---|---|---|
| 1 | F. T. Mills ... ... ... ... | White Rocks ... ... | 97 | 235 |
| 2 | N. H. M. Cole ... ... ... ... | White Wyandottes ... | 88 | 306 |
| 3 | F. T. Mills ... ... ... ... | White Rocks ... | 59 | 84 |
| 4 | S. C. Skaife ... ... ... ... | White Wyandottes ... | 70 | 352 |
| 5 | E. F. Watermeyer ... ... ... | Croad Langshans ... | 84 | 187 |
| 6 | H. H. Bright ... ... ... ... | White Leghorns ... | 76 | 236 |
| 7 | S. Smith ... ... ... ... ... | " ... | 81 | 379 |
| 8 | N. H. M. Cole ... ... ... ... | Brown Leghorns ... | 90 | 330 |
| 9 | Jas. Cook ... ... ... ... ... | White Leghorns ... | 89 | 285 |
| 10 | R. G. Hudson ... ... ... ... | " ... | 63 | 259 |
| 11 | N. H. M. Cole ... ... ... ... | " ... | 84 | 241 |
| 12 | Hatherley Poultry Farm ... ... | " ... | 93 | 282 |
| 13 | C. S. Boyes ... ... ... ... | " ... | 82 | 327 |
| 14 | H. H. Bright ... ... ... ... | " ... | 95 | 258 |
| 15 | Mrs. R. F. Dott ... ... ... ... | " ... | 80 | 249 |
| 16 | T. Vollmer ... ... ... ... | " ... | 93 | 188 |
| 17 | " ... ... ... ... | " ... | 80 | 212 |
| 18 | C. W. Baldock ... ... ... ... | " ... | 92 | 343 |
| 19 | S. Smith ... ... ... ... ... | " ... | 95 | 286 |
| 20 | Mrs. R. Archibald ... ... ... | " ... | 81 | 295 |
| 21 | B. Kauffman ... ... ... ... | " ... | 87 | 313 |
| 22 | G. J. V. Biccard ... ... ... ... | " ... | 75 | 260 |
| 23 | C. S. Boyes ... ... ... ... | " ... | 52 | 202 |
| 24 | H. H. Bright ... ... ... ... | " ... | 71 | 231 |
| 25 | S. Smith ... ... ... ... ... | " ... | 94 | 256 |
| 26 | W. L. H. Rose ... ... ... ... | " ... | 80 | 212 |
| 27 | H. N. Wheeldon ... ... ... ... | " ... | 96 | 338 |
| 28 | B. Kauffman ... ... ... ... | Black Leghorns ... | 90 | 275 |
| 29 | O. C. Macpherson ... ... ... | White Leghorns ... | 80 | 232 |
| 30 | W. and H. Meihuizen ... ... ... | " ... | 96 | 243 |
| 31 | Graham Hope & Co. ... ... ... | " ... | 92 | 351 |
| 32 | H. Curtis ... ... ... ... ... | " ... | 69 | 199 |
| 33 | A. Aitken ... ... ... ... ... | " ... | 98 | 206 |
| 34 | R. G. Hudson ... ... ... ... | " ... | 99 | 220 |
| 35 | H. H. Bright ... ... ... ... | Black Leghorns ... | 75 | 223 |
| 36 | G. J. V. Biccard ... ... ... ... | White Leghorns ... | 90 | 242 |
| 37 | W. H. Hart ... ... ... ... | " ... | 91 | 213 |
| 38 | R. G. Hudson ... ... ... ... | " ... | 95 | 224 |
| 39 | B. Kauffman ... ... ... ... | " ... | 94 | 286 |
| 40 | Mrs. R. A. Leggatt ... ... ... | Anconas ... ... | 89 | 275 |

### MANAGER'S REPORT.

The number of eggs laid this month is 3522 which, with deductions for eggs under $1\frac{3}{4}$ oz. of 137, makes a total recorded to pens of 3385, an advance on last month and more encouraging. The month began well, but after the first few days the eggs fell off in number,

causing serious consideration of the food supply, especially the granulated whale meat, and it was decided to discontinue its use altogether, to increase the amount of the evening mash adding to it three times a week—half ounce each bird, of minced raw liver. The benefit of this was soon seen and a gradually increasing supply of eggs. The supply of green food has been more regular, especially since some bags of lucerne have been kindly sent by an exhibitor.

The lowest number of eggs recorded was 71 on the 9th, and the highest 173 on the 28th.

Three pens laid over 100, and nineteen others had over 90, whi'st the totals again show a great evenness all through

The deductions for undersized eggs have been heavier than anticipated, but they occurred mostly early in the month; the last half, since the change of food, showing a considerable improvement.

Two pens had over twenty and two over ten, the remainder being distributed over the pens, in ones to six.

Birds in pens 2, 5, 7, 9, 33, and 35 have been broody, the latter for only two days, and all but one bird from pen 5 are back again.

The general health has been good during the month. A bird in pens 23, 26, and 32 has been troubled with egg binding or ovary troubles.

No. 46A of pen 23 passed a deformity of egg matter which has been submitted for analysis.

One bird of pen 3 was found dead in the pen on the morning of the 29th, and on examination by the Veterinary Division of the Department of Agriculture was found to have internal hæmorrhage, resulting from a ruptured spleen. No previous symptoms pointed to illness of any nature.

An analysis of the whale meat kindly sent from Elsenburg shows: "moisture 13·05, ash 3·53, proteid 65·99, oil 17·07, fibre ·59," and states that, "sterilization has unfortunately not been such as to prevent decomposition later; the odour and flavour render it unpalatable and lower very materially its value as part of a food ration.'

The weather has been cold for the time of the year with heavy rains at times, tending to reduce the egg yield somewhat.

Next month it is expected the continued change of food and spring weather will give the birds an improved record.

S. A. WEST, Manager.

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# Departmental Notices.

## TOBACCO SEED.

The Tobacco and Cotton Division has a quantity of selected and acclimatized tobacco seed of heavy and bright types for distribution during 1913. All applications for seed must be sent to the Chief of the Tobacco and Cotton Division, P.O. Box 516, Pretoria, accompanied by postal orders to cover cost of same.

This seed will be distributed pro ratio at a charge of 1s. per oz.

*Turkish Tobacco Seed:* The following varieties of Turkish seed can be obtained from the Officer in Charge of Turkish Tobacco Experiments, Stellenbosch, Cape Province, at the prices quoted, viz.:—

| | |
|---|---|
| Soulook | 4s. per oz. |
| Malcadje | 4s. „ |
| Baladovari | 4s. „ |
| Dubeck | 5s. „ |

W. H. SCHERFFIUS,
*Chief of Tobacco and Cotton Division.*

## CLEANING AND GRADING TOBACCO SEED.

The Tobacco and Cotton Division, Union Department of Agriculture, Pretoria, are prepared to clean and grade tobacco seed sent to them by farmers free of charge.

The process separates the light from the heavy seed, and the result is that a much larger percentage of the cleaned seed will germinate.

W. H. SCHERFFIUS,
*Chief of Tobacco and Cotton Division.*

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## VETERINARY RESEARCH LABORATORY, ONDERSTEPOORT.

### ADMISSION OF VISITORS.

It is hereby notified for the information of the public that visitors cannot be admitted to the Veterinary Research Laboratory at Onderstepoort during working hours on weekdays unless a special permit has previously been obtained from the Secretary for Agriculture.

The most convenient time for visitors to be shown over the Laboratory is Sunday afternoon, when an officer will be specially detailed for the purpose and permits will not be required.

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## BURSARIES AT AGRICULTURAL SCHOOLS.

1. It is hereby notified that the Government proposes to give a certain number of bursaries at the Schools of Agriculture to deserving students whose parents or guardians are not in a position to pay the school fees.

2. These bursaries, tenable for two years, will be of the value of £25 per annum and £50 per annum, according to the financial circumstances disclosed by the applications.

3. Applicants must not be less than sixteen years of age and not over nineteen years. They must produce evidence of having passed the "School Higher" Examination or its equivalent, and furnish certificates of age, good conduct, and health. A certificate will also be required from a magistrate to the effect that the parents or guardians of the applicant are not in a position to maintain him at one of these institutions without some abatement of fees being made.

4. Applications for these bursaries, supported by the above documents, must reach this Department, addressed to the Secretary for Agriculture, not later than the 25th November next. Successful candidates will be required to take up their studies in January, 1914. By accepting a bursary candidates will be deemed to have undertaken to complete the full course of two years.

5. The Schools of Agriculture are Elsenburg and Grootfontein (Cape Province), Potchefstroom (Transvaal), and Cedara (Natal), and applicants should state which of these schools they would like to enter in the event of receiving a bursary. Endeavours will be made to meet wishes expressed in this direction.

6. Should there be any bursary unallotted and for any reason a particularly deserving student already at one of the Agricultural Schools become in need of financial assistance, such may be allotted to him by the Minister.

7. The Minister may cancel without notice the award of any bursary if he is not satisfied with the conduct or progress of the student, or cancel or modify it if he is of opinion that the need for financial assistance has ceased to exist.

8. In the event of candidates considered to have approximately equal claims to receive a bursary, the matter may be decided by examination.

ALEX. HOLM,
for Secretary for Agriculture.

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## GOVERNMENT WINE FARM, GROOT CONSTANTIA.

### VISITORS' DAYS.

It is notified by the Secretary for Agriculture that it has been decided that persons shall be allowed to visit the Government Wine Farm at Groot Constantia between the hours of 9 a.m. and 5 p.m. on Mondays, Tuesdays, and Thursdays.

## SCHOOLS OF AGRICULTURE.

### AREAS OF OPERATION.

It is hereby notified that the following are the areas of operation of the various Schools of Agriculture, and that inquiries dealing with agricultural subjects should be addressed to the Principal of the School which serves the locality in respect of which the inquiry is made:—

*School of Agriculture, Cedara.*—The whole of the Natal Province and Griqualand East.

*School of Agriculture, Grootfontein, Middelburg, Cape.*—That portion of the Cape Province lying south of the Orange River (excluding the area served by the School of Agriculture, Elsenburg), and the Transkerian Territories (excluding Griqualand East).

*School of Agriculture, Elsenburg.*—The coastal districts from Namaqualand to Knysna, and the Districts of Ceres, Worcester, Robertson, Swellendam, Paarl, Tulbagh, George, and Montagu.

*School of Agriculture, Glen, near Bloemfontein.*—The whole of the Orange Free State, that portion of the Cape Province lying north of the Orange River, and British Bechuanaland.

*School of Agriculture, Potchefstroom.*—The whole of the Transvaal Province.

ALEX. HOLM,
*Under-Secretary for Agriculture.*

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## ELSENBURG SCHOOL OF AGRICULTURE.

### LARGE BLACK AND BERKSHIRE PIGS FOR SALE.

Farmers are advised that the above institution has for sale a number of young pedigree Large Black and Berkshire pigs.

Prices range from 40s. to 100s. according to age and quality.

Application should be made to the Principal, School of Agriculture, Elsenburg, Mulders Vlei, C.P.

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## PIGS FOR SALE.

Large Blacks and Berkshires are for sale at £3. 3s. each from the School of Agriculture Cedara.

Applications should be addressed to the Principal.

Large White, Yorkshire, and Berkshire Pigs are for sale from the Tweespruit Stud Farm, P.O. Tweespruit, and Large Blacks and Berkshires from the Roodepoort Stud Farm, P.O. Dewetsdorp. Inquiries should be addressed to the Managers of the farms mentioned.

Pedigreed Large Black pigs, farrowed 17th March, 1913, are for sale from the School of Agriculture, Grootfontein, Middelburg, Cape Province.

Inquiries should be addressed to the Principal.

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## SALE OF POULTRY AND EGGS.

Pure bred poultry, of different breeds, also sittings of eggs are obtainable from the Schools of Agriculture, Potchefstroom, Transvaal; Elsenburg, Mulders Vlei, and Grootfontein, Middelburg, Cape. All particulars should be obtained from the principals.

### PRICES.

*Poultry.*—5s. to 25s., according to age and quality.

*Eggs.*—10s. 6d. per dozen (poultry); 10s. 6d. to 20s. per dozen (turkeys and geese).

It should be understood that the poultry is essentially utility. No attempt is made to breed or sell prize poultry. Orders must be accompanied by remittance.

## TESTING OF MILK AND CREAM SAMPLES.

The testing of samples of milk and cream for butter-fat will be undertaken by the Department of Agriculture at the places mentioned hereunder.

Farmers desirous of having milk or cream tests made should—according to the locality of their farms—communicate with the following officers :—

*Cape Province (Western).*—Principal, School of Agriculture, Elsenburg, Mulders Vlei.

*Cape Province (Eastern).*—Principal, School of Agriculture, Grootfontein, Middelburg Cape.

*Transvaal.*—Principal, School of Agriculture, Potchefstroom, and Superintendent of Dairying, Pretoria.

*Natal.*—Principal, School of Agriculture, Cedara.

*Orange Free State.*—Pending the establishment of an Agricultural School in the Orange Free State, samples from farms south of Bloemfontein should be sent to the Principal, School of Agriculture, Grootfontein, Middelburg, Cape, and from farms north of Bloemfontein to Potchefstroom or Pretoria as stated above.

### FEES.

The charge for testing is 6d. per sample of milk or cream, but if ten or more samples are forwarded by the same owner in one consignment a reduction of 25 per cent. on the charge will be made. Payment must be made when the samples are forwarded, either by postal order or by cheque. Postal or railage charges must be prepaid by the sender.

### INSTRUCTIONS FOR TAKING SAMPLES.

*Milk (mixed).*—In taking a sample of mixed milk from a number of cows, the milk must be poured from one vessel to another several times, and the sample must be taken immediately before the milk is allowed to settle. If the sample is made up from mixed milk from several vessels, it should contain the quantity from each vessel which will ensure that the completed sample is an average of the whole bulk. The stirring of the milk is in each case not sufficient.

*One cow.*—The cow must be stripped thoroughly, the milk strained and well mixed by pouring from one vessel to another several times, and the sample must be taken immediately after, before the milk is allowed to settle.

*Cream* samples should be prepared by stirring thoroughly and by pouring the cream from one vessel to another several times, and the sample must be taken immediately after.

(NOTE.—If it is desired to take composite samples of milk or cream application should be made for full information and instructions, which will then be given.)

*Bottles.*—The sample bottles should contain about ¼ pint of milk or cream. They must be thoroughly cleaned, and each sample must be labelled with the name of the owner; if it is taken from the mixed milk of a herd it must be marked "mixed." In the case of samples of individual cows each sample must, in addition to giving the name of the owner, be marked with the name, number, or other identification mark of the particular cow. Particulars of the breed of the cow or herd must also be stated. If in the case of samples of mixed milk the animals are not all pure bred, the particulars should be given as "cross-bred" or "mixed breeding." Labels will be supplied on application. Care should be taken to have the bottles well corked and sealed before dispatch.

*Preservatives.*—To each sample bottle of milk should be added four to six drops of formalin (not more) and to each cream sample five grains of powdered potassium bichromate, or just as much as can be carried on a threepenny piece.

In offering these facilities it is desired to place farmers in the position of being able to determine the butter-fat content of the milk of their herds and the percentage of butter-fat in the cream, to check the working of the separator by testing samples of the separated milk, and, lastly, to encourage the keeping of milk and butter-fat records. In the latter instance, samples should be submitted at regular intervals, either fortnightly or monthly. For any further particulars or information inquiries should be addressed to the Principals or Superintendent of Dairying, as indicated above.

The result of these tests may only be used by the owner of the samples for his private purposes, and must not be made use of in the case of any dispute or legal action between contracting parties.

ALEX. HOLM,
*Under-Secretary for Agriculture.*

UNION DEPARTMENT OF AGRICULTURE.

## Schools of Agriculture at Cedara, Natal; Elsenburg, Cape; Grootfontein, Middelburg, Cape; Potchefstroom, Transvaal.

# Courses in the Practice and Science of Agriculture.

The ordinary course of two years is essentially one which gives a sound practical as well as technical training to the young farmer.

An optional third year's course can be taken for special study in certain subjects.

Upon completion of the ordinary course the student is granted, after satisfactory examination, either the "Diploma" of the Institution (the higher award) or a "Certificate in Agriculture."

At the close of the optional additional course, a due standard of proficiency attained in the subjects chosen entitles the student to receive the special "Honours Diploma."

The course begins in January of each year. Students are not admitted at any other time, and applications will be dealt with in order of their receipt.

The fees, which are payable quarterly in advance, are £50 per annum, inclusive of board, laundry, and ordinary medical attendance.

The following are the conditions governing admission to the course beginning in January, 1914 :—

(1) Candidates must be over 16 years of age.

(2) Candidates will, if accepted, be required to undertake to complete the course of two years.

(3) Candidates must furnish with their application

  (*a*) proof that they have passed at least the 7th standard of an elementary school or its equivalent;

  (*b*) evidence of good moral character and sound health.

Students are advised to attend the school situated on the farm where the farming conditions approximate most closely to those that obtain where the student is likely to farm on completion of his course of instruction.

Horticulture, Poultry Husbandry, Dairying, Cropping, and Stock Farming generally are taught at all the institutions. Special features of the courses at the different institutions are as follows :—

*Elsenburg.*—Horticulture, Viticulture and Winemaking, Cereals, and Tobacco (Turkish).

*Cedara.*—Sub-tropical Agriculture, Forestry (including Wattle-growing), Cattle, and Maize.

*Grootfontein.*—Agriculture (including Irrigation under Karoo conditions), Ostriches, Merino Sheep, Angora Goats.

*Potchefstroom:* Agriculture representative of high veld conditions, Cultivation of crops under irrigation and otherwise, Cattle, Maize and other cereals.

For further particulars inquiries should be addressed to the Principals of the Schools, to whom applications for admission should be submitted on form which will besupplied on request.

ALEX. HOLM,
*Under-Secretary for Agriculture.*

## MEXICAN PINES—TRANSPLANTS FOR SALE.

A limited number of these plants are now available for distribution from Irene Nursery, as detailed below. These pines have been introduced experimentally as being specially likely to be suitable for the summer rainfall parts of this country, the climate of which resembles closely that of Mexico. The latter is also a high tableland, with rainfall of about 20 to 30 inches occurring in the summer and with dry winters and springs, heavier rainfalls and mist occurring on the slopes facing the sea, or on the high snow-capped mountains. These pines are found chiefly in these moister localities with rainfalls of from 30 up to 50 or 60 inches, and are so specially likely to succeed on the moister mountain slopes of the eastern Transvaal, etc. Some of them are, however, well worth trying on the high veld.

They may be grouped as follows:—

1. *Species of the Sub-tropical Zone.*—These may be tender to frost and need not be tried on the high veld, but may be tried on parts of the middle veld where rainfall is 25 inches or more.

*Pinus oocarpa.* *Pinus oocarpa*, var. *microphylla.*

These are only medium sized trees, but should at least be suitable for ornament, shelter, etc.

2. *Species of Colder Zones.*—These should be tried on the high veld where the rainfall is not less than 25 inches. Young plants of these kinds are already promising well at the Government plantations on the high veld and have proved hardy to frost.

*Pinus montezumae.* *Pinus leiophylla.*
*Pinus montezumae*, var. *lindleyi.* *Pinus patula.*

These are all fast-growing trees and usually reach a large size.

3. *Species suitable for Drier Localities.*

*Pinus nelsoni.*

This is a small tree from a dry district in Mexico. It may be tried for ornamental planting, etc., in the drier parts of the Transvaal as well as on the high veld.

The plants are available as follows:—

| | One in large tin. Price per tree. | One in small tin. Price per tree. | About 25 in tin. Price per 100. |
|---|---|---|---|
| *Pinus oocarpa* ... ... ... | — | — | 15s. |
| *Pinus oocarpa*, var. *microphylla* | — | — | " |
| *Pinus montezumae* ... ... | 1s. 6d. | 9d. | " |
| *Pinus montezumae*, var. *lindleyi* | " | " | " |
| *Pinus leiophylla* ... ... | — | — | " |
| *Pinus patula* ... ... ... | 1s. 6d. | 9d. | " |
| *Pinus nelsoni* ... ... ... | " | " | " |

Applications should be addressed to the Government Forester, P.O. Irene.

It is expected that purchasers will take special care of the trees and will be willing to furnish reports on them when requested to do so from time to time. They should preferably be planted in deep soils of a sandy or loamy nature, or in soils containing loose rock, but may be tried also in heavier soils, which do not get water-logged.

Applicants should state the species and the maximum number of plants desired, but the numbers actually supplied will be at the discretion of the Department.

# The Agricultural Journal

## OF THE UNION OF SOUTH AFRICA.

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## Editorial Notes.

**Our Agricultural Journals.**

As this is the last number of the *Agricultural Journal* to be issued by the present Editor after an uninterrupted period of ten years and ten months in the editorial chair of the Department of Agriculture, it may be of interest to briefly review the rise and progress, as well as the editorial changes, in the Government *Journals* since their commencement.

The first agricultural periodical started in South Africa, under the auspices of the Government, was the *Cape Agricutural Journal* in the year 1888. The first editor, who held a more or less honorary position, was Mr. Albrecht Fisher. He performed many other functions than that of a mere purveyor of agricultural news. This official studied at Stuttgart, Hohenheim, and Baden in Germany, and was appointed Professor of Experimental Science and Agricultural Chemistry at the Victoria College, Stellenbosch, in 1883; Secretary for Agriculture in 1887; and retired in 1892. The second editor was the late Mr. J. B. Hellier, who was appointed to this post on the 1st July, 1893, where he remained until his death. This gentleman had a long and varied career in the old country, and it is said that he was the editor of the first agricultural paper ever published in South Africa. He is well remembered by the older members of the Cape Agricultural Department as a genial colleague, full of interesting and amusing reminiscences. Mr. Hellier took a keen and active interest in the land settlement schemes of the Eastern Province. His son is now a member of the Provincial Council for East London.

The next editor of the *Cape Agricultural Journal* was Mr. F. D. MacDermott, who left the *Cape Mercury* to take up this post in the year 1902. Mr. MacDermott's active personality was soon felt and several improvements in the paper were effected. At Union when the Cape, the Natal, and the Transvaal *Journals* were merged into

one, Mr. MacDermott was appointed editor—a position he held until September, 1912, when he decided to lay down the pen and take up the plough and become a practical farmer. Turning to Natal we find that the first Government publication was issued in the year 1898 under the title of *The Agricultural Journal and Mining Record*. This journal was edited by Mr. H. Ryle Shaw, who had formerly been editor of *The Times of Natal*. In the introductory note there is an amusing caution that "political opinions and personal remarks will be strictly excluded." The first article is on "The Construction of Small Dairies," by Mr. E. O. Challis, who has been so long and so honourably connected with this industry. In the year 1907 a new editor was appointed in the person of Mr. H. J. Choles. At Union Mr. Choles was transferred from Maritzburg to Pretoria, as Assistant Editor.

It gives us pleasure to acknowledge our indebtedness to Mr. Choles, whose industry and enthusiasm for all farming matters has greatly strengthened the Department of Agriculture.

Finally, a word in regard to the *Transvaal Agricultural Journal*. It was started in October, 1902, and the first two numbers were edited by Mr. H. R. Burton, F.R.G.S., an able and widely travelled journalist. The *Transvaal Journal* was issued quarterly. From the third to the thirty-third number it was edited by the present writer when it was merged in the *Union Journal*. It is, therefore, twenty-five years since the first *Cape Journal*, fifteen years since the first *Natal Journal*, and exactly eleven years since the first *Transvaal Journal* left the printing press. And to-day we are in the third year of the *Union Agricultural Journal*. The first *Transvaal Journal* started with a circulation of 2000. The present *Union Journal* has a circulation of 40,000.

The Editor desires to bid farewell to his readers, and he is confident that the generous support accorded to him by the farming population of South Africa will be given to his successor. He would leave with them the simple motto of Cyrus H. McCormick, the inventor of the reaper: "This is not the world for rest. This is the world for work. In the next world we will have the rest." Nor must he omit to thank the Chief Translator, Mr. Otto Menzel, the Government Printer, and the members of his staff for their kindly co-operation and unfailing courtesy in all matters connected with the Dutch edition and the publication of the *Agricultural Journal*.

**Planting Sand Dunes.**

We are glad to welcome to Pretoria Mr. E. B. Dwyer, who has been recently appointed Assistant Conservator of Forests for the Transvaal Conservancy. Born in Lancashire, England, Mr. Dwyer has been in South Africa practically all his life. He entered the Cape Civil Service in the year 1889 and has been successively stationed at Kingwilliamstown, Keiskama Hoek, Stutterheim, and lately at Port Elizabeth. His chief work has been in connection with the reclamation of the Port Elizabeth drift sands, and our readers would doubtless like to know the history of this interesting and successful enterprise.

A large sand drift was slowly but surely encroaching upon the town lands and the harbour works. It started along the coast about twelve miles west of Cape Recife, and drifted across the promontory and entered the sea at Algoa Bay immediately to the south-east of the town of Port Elizabeth. On the recommendation of Sir John Coode, the eminent marine engineer, the Harbour Board, some time in the seventies, took the matter in hand and began to reclaim the drift from the windward end at a place called Governor's Kop. They kept pegging away with varying success until the year 1890, when they requested the Government to take up the matter and to place it in the hands of the Forest Department. The conditions were that the local Harbour Board should contribute £1000 and the Divisional Council £500 per annum towards the cost of the operations; the former body also handing over all plant and buildings on the affected area.

Accordingly, Mr. Lister, formerly Chief Conservator of Forests, was called in and framed a scheme whereby the work would proceed more rapidly and systematically. In the Harbour Board scheme brushwood was used. The Conservator of Forests proposed that a railway should be laid from the town and that the town refuse—stable litter and street sweepings—should be utilized for fixing the sand. This plan was ultimately adopted, and in 1893, the Forest Department took charge of the work. Mr. Lister estimated that this work would take sixteen years to complete, and as a matter of fact it was just finished within that period. In 1898 Mr. Dwyer was appointed District Forest Officer at Port Elizabeth, and then took charge of the operations. The work was carried on chiefly by means of convict labour and the area actually spread with refuse and brushwood was 5100 acres. The sand was first sown with a mixture of *Acacia cyclopis* and *Acacia saligna* and a little indigenous grass seed (*Ehiharta gigantea*). Then the town refuse or brushwood was spread lightly over it. That protected and kept the seed quiet enough to allow the germination of the seed. Many other seeds came up in the refuse and all helped to bind the sand until the trees grew large enough to completely check the drifting sand. It should be mentioned that before commencing an artificially raised sand hill was erected along the coast line, where the sand was blown in from the beach near Governor's Kop, so as to block the gulch-ways through which the sand was being blown up from the beach inland. This *littoral* dune was raised by means of wattle barriers and is now two miles long and about 45 feet high in the centre. It is now being consolidated by means of marram grass (*Ammophila arenaria*).

The plantations on the earlier reclaimed areas are at present being worked, and poles, fencing droppers, firewood, and charcoal are being sold to the public. The worked areas are now being replanted with more valuable trees, chiefly gums, *Eucalyptus diversicolor* (Karri gum) and *Eucalyptus gomphocephala*. In short, the main object of all this reclamation work was the protection of the harbour and the southern part of the town, which has been successfully accomplished. Reclamation by means of marram grass is cheaper and slower than the method just described. This system has been adopted in the Cape Peninsula near Muizenberg, at the Cape Agulhas Lighthouse, and at other places on a smaller scale. At Port Nolloth a considerable area of drift sand near the harbour was

reclaimed by means of an indigenous grass called *Eragrostis spinosa*. The credit for this work belongs to Mr. Heywood, now Conservator of Forests in Natal.

**Modern Agriculture.**

We have just received from the Gresham Publishing Company, of London, through the agents (Messrs. D. E. McConnell & Co., 32 St. George's Street, Capetown), a most valuable work entitled "The Standard Cyclopedia of Modern Agriculture and Rural Economy." It is issued in twelve volumes, contains over 5000 articles by eminent specialists, and covers practically the whole field of modern agriculture. It is edited by the well-known authority Professor Sir R. Patrick Wright, who is Chairman of the Scottish Board of Agriculture.

This cyclopedia is nicely printed and the illustrations are excellent. The numerous coloured plates and anatomical models are of a high educational value. These volumes should find a place in the bookshelf of every South African farmer. It would be impossible to attempt to fully review, with the space at our disposal, even a single volume. So we must content ourselves with briefly touching upon a few of the more interesting articles.

In a work published in Great Britain it is gratifying to note the number of pages devoted to the Rural Economy of the Dominions. A comprehensive and interesting article on South African agriculture is contributed by Mr. F. B. Smith, the Secretary of Agriculture for the Union. In speaking of the soils of South Africa, Mr. Smith writes (Vol. XI, page 69): "Judged by European standards the soils are not rich; but owing to the amount of light and warmth, and to their open texture, what plant food there is in them is readily available, and given a sufficiency of water the growth of crops is rapid and abundant. They are 'grateful' soils and respond readily to manures." The second volume opens with an interesting review of the agriculture of Australia, to which ten pages are devoted. It is instructive to learn that during the past one hundred years the value of wool produced has attained the colossal sum of £647,000,000. On referring to our latest official year-book (1912) we note that the Commonwealth stands at the head of all other countries with 93,003,521 sheep, and the value of the output of wool for 1911 was £28,400,000. We are pleased to note that Sir Robert Wright, notwithstanding his long residence in the damp and misty climate of the West of Scotland, has accorded dry-farming a prominent place in Vol. XII (page 236). The admirable article on this subject is from the pen of Mr. W. H. Fairfield, Superintendent of the Dominion Experiment Station, Lethbridge, Alberta. Mr. Fairfield has been for many years engaged in experimental work in the "Dry-Belt" of Canada.

A most valuable account of milking machines is given in Volume IX (pages 25-28). We hope these marvellous machines will be adopted all over South Africa wherever dairying is practised on a large scale. We frankly confess that the filthy methods of handling milk on many farms in this country still make us shudder. How often have you seen the genial native cowman gaily milking in

the kraal, ankle-deep in manure, while a dirty unwashed udder hangs over an open pail. Is it any wonder that the milk is soon soured by millions of putrefying bacteria or that the patrons of the dairy are stricken with diarrhoea, gastritis, or enteric?

Although Americans have been working since the opening years of the nineteenth century in trying to substitute machines for hand-milkers, the credit of evolving the first practical milking machine belongs almost entirely to Scotland. The best known and most successful milking machine now on the market is the Burrell-Lawrence-Kennedy. The operation of milking a cow by the machine occupies from four to seven minutes. The machine removes the milk as effectively as, and more rapidly and steadily than, the average hand-milker. The animals take to the machine very kindly, and stand chewing the cud, quite at ease, after becoming accustomed to the sight of the apparatus beside them. They seem to be less disturbed by the machine than with an ordinary staff of hand milkers. With the help of a boy to carry the milk and attend to the engine, one active person can manipulate four machines so as to milk from fifty to sixty cows per hour. The machines are comparatively simple in action and do not go readily wrong, while the more delicate parts are quickly replaceable. When the sanitary aspect is considered, there is strong evidence in favour of milking by machine. The possibility of contamination is greatly reduced. The milk is conveyed in closed ducts from the interior of the udder to the sealed milk pail; all dust particles are excluded. Any air admitted to the milk is filtered free from germs. Under ordinary conditions the sediment found in machine-drawn milk is less than one-tenth of that found in hand-drawn milk. By taking special precautions, machine-drawn milk can be obtained almost perfectly clean and practically free from germs and it constitutes a superior article and deserves to commend a higher price.

**Farming in the Free State.**

The other day we paid a visit to a farm in the conquered territory of the Free State which lies in the Brandwater Basin, twelve miles from Fouriesburg, in the District of Ficksburg. It belongs to Mr. Robert Meynell, and consists of 1400 morgen, a large portion of which pays tribute to the plough. The pretty homestead, a photo of which appears on the cover plate of the *Journal*, nestles in the shadow of a noble mountain, termed in the native tongue "Thaba Bosigo" or Mountain of Night. This rare and beautiful name was given by the Basutos to this mountain because the afternoon sun is soon lost behind it, and the nearby kloof, valley, and plain are all plunged in the blackness of night. But let us now listen to Mr. Meynell, whose Basuto name is "Machecheese" or "one who works quickly."

*Tell us how you happened to come here?*—Well, after having seen service in the 53rd Shropshire Infantry I came to South Africa on a visit. I was much struck with the country and decided to settle down in the Free State. In order to get practical experience and a knowledge of the peculiar conditions of South Africa I spent some time on a farm in this Province and finally bought this place in the year 1907. In passing, I might remark that I believe that every prospective

settler should spend a year or so on an up-to-date farm before settling down on his own land, otherwise he will soon lose any capital he may possess.

*What are your Principal Crops?*—Wheat is at present my main crop, and I have now 500 acres under this cereal. I find that wheat does very well on black land, but on sandy land it is liable to burn. I have paid a good deal of attention to what might be termed the business side of farming, and the following figures may interest you. I find that it costs me 6s. 8d. to produce a bag of wheat and I usually sell it at an average price of £1 per bag. I pay 9d. per bag for threshing, but this item is included in the figure of cost. As the railway runs through my farm the transport of corn to the station, or rather siding, costs practically nothing. I sow my wheat with a monitor drill and usually seed 1¾ bushels per acre. (A bushel = 60 lb.) Of course, all my wheat is grown on dry lands, without any irrigation. I sow it from April till May and reap it in January.

*Do you grow Potatoes?*—Yes, I grow potatoes on a fairly large scale. I find that Up-to-date and Evergood are the best varieties for this part of the country. I calculate that potatoes cost me 4s. 4d. to produce and I sell them on an average at 15s. 3d. per bag of 150 lb. I find that I can make a profit, taking rail and commission costs into account, when potatoes are selling at 8s. per bag, and naturally my profits increase as the market price rises. I work as rapidly as possible and use a potato planter and a digger. My first planting of potatoes takes place in the end of August and they are usually ready for lifting at Christmas; my second planting is done towards the end of November. I produce up to 1000 bags and ship them to Johannesburg. I use fertilizers, both Fisons and Safco, at the rate of 400 lb. per acre, and this costs me approximately £1. 13s. per acre. I find it pays to fertilize potatoes and I get on the average fifty-three bags to the acre. I do not grow mealies on a large scale as I have so much grass for my live stock, but I have proved that harrowing the growing maize plants until they are about 18 inches has a most beneficial effect upon the crop. A good deal of my land consists of a silty loam—the wash from the mountain and stream—and I expect to raise an excellent crop of lucerne when my dam is in working order.

*Do you go in for Dairying?*—Yes, I believe this part of South Africa is the finest cattle country in the world. We have an abundant supply of succulent, sweet grass. I never allow my veld to be burned. Burning has a bad effect upon the grass, which gets coarser and coarser, whereas by grazing and paddocking your lands the grass improves year by year. I have a mixed herd of cattle and propose to gradually grade them up by the use of pure bred bulls. I shall soon be sending to the Bethlehem Creamery, every month, cream to the value of £25 to £30.

*What about Labour Conditions and Farming Generally?*—Although many farmers in the Free State complain about the scarcity of labour I never have any trouble. The great thing is to have a good name amongst the natives. If you have a good name natives will always come and work for you. If you have not you cannot procure them at any price. I never pay my "boys" more than 15s. per month with mealie meal, except during harvest time when I pay them at the rate of 1s. 6d. a day.

To my mind South Africa is by far the best farming country in the British Dominions. We have the finest climate in the world. Here

a man can work all the year round. That is the first point, the second is our cheap labour; while the third is that we can make much higher profits per acre than is possible either in Canada, Australia, or New Zealand. Lastly, but most important, the farmer's wife has an easier and a better time in South Africa than in any of the other Dominions. I am amazed that more young men from Great Britain do not come to this country; it offers splendid opportunities for farming. I am also surprised to see, from time to time, intelligent Englishmen, men of means, investing their money in risky ventures in foreign countries when the Union offers such magnificent and safe returns in her farm lands which are daily advancing in value. Besides which, from a sentimental standpoint, all true patriots should endeavour to circulate money within the Empire rather than to spend it in the development of foreign fields.

**Agricultural Research.**

In the presidential address to the British Association under section M, Agriculture, Professor T. B. Wood gave an instructive survey of the progress of agricultural research during the past quarter of a century. He pointed out that the conservative nature of the average farmer had been a safeguard to him in many cases. Almost every one thought himself competent to criticize the farmer, who was commonly described as too self-satisfied to acquaint himself with new discoveries, and too conservative to try them when they were brought to his notice. Let them examine the real facts of the case. Did the farmer ignore new discoveries? The largely increasing practice of consulting the staffs of the agricultural colleges which had arisen among farmers during the last few years conclusively showed that he did not: that he was, in fact, perfectly ready to avail himself of sound advice whenever he could.

The chief danger seemed to be that he tried new things simply because they were new, and he might be disappointed if those who were responsible for the new things in question had not taken form to ascertain with certainty that they were not only new but good. Farmers were nowadays in what might be called a very receptive condition. Witness the avidity with which they paid extravagant prices for single tubers of so-called new, but inadequately tested, varieties of potatoes, some years ago, and in a much less degree the extraordinary demand for seed of the much-boomed French wheats and the excitement about nitrogen for soil or seed inoculation.

Witness, too, the almost universal failure of the new potatoes and French wheats introduced during the boom and the few cases in which nitrogen gave any appreciable result. The farmer who was disappointed with his ten-guinea tuber, his expensive French wheat, or his culture of nitrogen could not but be disillusioned. Once bitten, twice shy. He did not readily take advice again. Professor Wood's remarks on this subject are quite as applicable to South Africa as to Great Britain. Let them, therefore, recognize that the farmers of the country were ready to listen to them and to try the recommendations, and let that very fact bring home to them a sense of our responsibility. All that was new was not therefore necessarily good. Before they recommended a new thing let them take pains to assure themselves of its goodness. To do so they must find not only that the new thing

produced a greater return per acre, but that the increased return was worth more than it cost to produce, and they must also define the area or the type of soil to which this result was applicable.

**Where Grain Elevators are Built.**

One hundred miles from London and twelve from Bath lies the pretty village of Melksham in Wiltshire. The passenger in an express train would imagine that he had been flashed through a typical English village, still dreaming of the days of "Lorna Doone." But were he to break his journey at this spot he would soon find out that here was a veritable hive of industry The best of English agricultural factories are no longer found in the great cities, but out in the open country, surrounded by green fields, with pleasant cottages and small holdings near by.

We hear much of the disadvantage of the farm labourer flocking to the town; but we hear much less of the advantage of the skilled mechanic settling in the village and bringing to it and the environs his industry and his enterprise. One fact will make this plain. Every morning 800 mechanics come into the village of Melksham to work in the factory from distances varying from two to ten miles, and return in the evening to their homes in the country by bicycle or motor cycle.

Thirty years ago Melksham was a slowly decaying community with a few straggling cottages. And like most centres of trade and industry Melksham owes its rise and progress mainly to the personality and foresight of one man. One day, a young engineer, Mr. William Littlejohn Philip, laid down his tools at the termination of a five years' apprenticeship in the city of Aberdeen, and set out to seek his fortune in the country of the Sassenach. He spent a short time in London and then applied for and obtained the post of manager of the Spencer Engineering Works. It was a very small affair then and Melksham was a humble unheard-of village. Since then huge buildings have been built, more land acquired, and handsome commodious cottages erected for the workmen. From the head office window you look right into a large well ventilated workshop where a thousand men are busily employed, where travelling cranes are picking up all kinds of machinery, loading them into trucks for distribution to all parts of the world. Over £40,000 are annually distributed in wages, and it must be satisfactory to the management that in all these years there has never been a single strike. We visited the foundry, wood-workshop, the erecting shop, and drawing office. We saw grain elevators being built for the Manchester Ship Canal, for the Clyde Navigation Company, and for Johannesburg. The mechanism of these electric elevators is truly marvellous. There is almost nothing they cannot do. Every sort of seed—maize, wheat, oats, soya beans, etc.—lying far down in the hold of a liner is sought for, swept into buckets, and elevated at the rate of 300 tons per hour. As the ship lightens and rises slowly upwards so the elevator arms shorten simultaneously. Messrs. Spencer & Company build elevators and silos for all classes of goods—grain, coal, and wood, even salt. They are building a 1000-ton silo for the Macadi Soda Company in British East Africa where a wonderful lake of soda has been recently discovered. One of the prettiest machines we

have ever seen we observed in this great factory. It is set to cut out the teeth of wheels. It toils, hour after hour, tirelessly, intelligently, humanly. As each tooth is finished it rises, pauses, and seems to take a long breath, then it gives a little jerk, it sweeps round the wheel rim, and begins sedately to cut out another tooth. No man is near it. It is a vital, uncanny, thinking thing. Here, as almost everywhere else in England, the clerical staff is manned, if we may so express it, by women. As we wandered through these works we wondered when Sir Thomas Price's admirable report on the grain trade of America will be put into practice; and when we may expect to see South Africa studded with inland and terminal elevators for storing our maize for dispatch to England, Europe, and the sister Dominions of our world-wide Empire.

**The Wattle Industry.**

It is a remarkable fact, and says much for the industry and high intelligence of the farmers of the smallest Province in the Union, that, unaided, they have built up the wattle, the tea, and the sugar industries, have conquered the cattle plague by means of the arsenical dip, and, at the same moment, have fulfilled the prophecy of Joel, the son of Pethuel, and have restored to the people of South Africa "the years that the locust hath eaten" by means of the arsenical spray. Last week, Sir George Sutton, founder of the wattle industry of this country, passed away at the ripe age of eighty at his home in Howick, and in this article we propose to show what he lived to see in the twenty-nine years that have elapsed since he started his first experiments in Natal.

It is always interesting to trace the humble origin of a great industry, and none is more instructive than the steady growth of wattle bark cultivation in Natal. Some seventy years ago a certain John Vanderplank sailed in his own vessel from Australia to England, carrying with him a cargo of wattles or mimosa bark, as it was then called. He sold his bark in London for £15 per ton, and with the profits he straightway purchased another ship. He then sailed for Table Bay. Shortly after his arrival he was asked by a Capetown merchant to convey stores to the Dutch people in Natal, who were then practically starving. To this he agreed, and arrived in Durban just one month after the massacre of Weenen. In recognition of his valuable services, Vanderplank was granted certain farms in the Camperdown District by the Dutch Government. A few years later, John Vanderplank returned to England, where he met his brother Charles, who had recently arrived from Australia. Charles had in his possession some seeds of his favourite tree, namely, the black wattle. And in their little lodgings in the heart of London we can well imagine that the two brothers had many a long talk over the possibility of establishing a new industry in South Africa. At any rate, John persuaded his brother to return with him to Natal, and promised him a free farm. The brothers arrived in 1864, and, soon after, the first black wattle seeds were planted at Camperdown, where the remains of the old trees are still to be seen.

The trees attracted a good deal of notice, and many of the transport-riders who passed through Camperdown collected the seeds and distributed them in various parts of Natal and the Free State;

Moreover, the trees were greatly prized for firewood, and were used as shade-screens, windbreaks, as well as for the protection of live stock. This was, of course, before the value of the bark became known. In those early days black wattles were always called "Vanderplank's Wattles" to distinguish them from the blue wattles which were also imported from Australia, and were locally known as "Henderson's Wattles."

The credit of first recognizing the value of the wattle for tanning purposes is due to the late Sir George Sutton. In a pamphlet which he wrote twenty years ago, entitled "Wattle Bark, a Paying Industry," he mentions that he sold wattle bark to a local tannery for experimental purposes in the year 1884. Three years later, Messrs. Angus, of Noodsberg, sent away the first shipment of wattle bark to England, namely, ten tons. The amount of bark exported last year was 111,205,090 lb., valued at £289,656.

*Product and Prices.*—Botanically, the wattle tree belongs to the well-known family of leguminous (pod-forming) plants of which the acacias are noteworthy members. Nearly all species of acacias produce bark containing tannin, but, of these, only a few contain enough to make them of economic importance. Of the many sorts which have been tested in South Africa, only the Golden, the Green, and the Black Wattle are suitable for this purpose.

The bark produced by the first two contains about an equal percentage of tannin, but the black wattle is said to give a higher yield of bark per acre. On the other hand, the green wattle is hardier than the black wattle, and is therefore of greater value where frosts occur. The golden wattle only grows satisfactorily in certain parts of Cape Colony, and is not climatically suited to the Transvaal. The heart of the wattle district of Natal is in Umvoti County, along the railway from Maritzburg to Greytown. But other centres are rapidly springing up, notably in Mid-Illovo. A light, narrow-gauge railway, which will tap this district, has lately been opened. Wattles will grow on the poorest soil, where nothing else will succeed. But for commercial plantations the site should be carefully chosen, where winter frosts are not severe and where the heat is not intense. The best soil is a deep loose loam, naturally well drained. The black wattle is a great absorber of moisture, and, consequently, does best in regions of good rainfall. In Natal the hilltops and ridges are considered the best sites, because of the mists which are formed on the high lands.

Suitable land for wattle growing within one hundred miles of Durban and at a reasonable distance from the railway can be bought at £3 per acre. Suppose a settler buys one hundred acres at this price—£300; add to this sum £200 for fencing, ploughing, and planting—£500. At the end of seven years he will be able to sell the trees as they stand on the ground for £900, making a profit of £400, besides having the freehold of his little property. In the meanwhile he might be earning his livelihood by working for some neighbouring farmer. Of course, should he wish to farm himself at the same time that his wattles were growing he would need an additional one hundred or two hundred acres of agricultural land; or he might hire a contractor who would plough, plant, and find wattle seed at 22s. 6d. per acre. In making these calculations, a few minor expenses must be taken into account, such as laying off fire-breaks for the protection of the plantation.

It is becoming a common custom for young men in Natal to purchase plantations right out at from £8 to £10 per acre, and after stripping the trees to make handsome profits out of the transaction. The man with capital or the company proposing to invest money in wattle growing, should remember that the cost of administering a plantation of one thousand acres is practically the same as the cost for five thousand acres. To establish a plantation of five thousand acres and to erect a saw-mill for the manufacture of boxes would cost £40,000. Such a plantation at the end of seven years, when the wattles were ready for breaking, together with the saw-mill, could probably be bought for £60,000 as a going concern. For such an investment it is usual to expect about 15 per cent. on the outlay.

A plantation should be near a railroad, not only for shipping the bark, but also for disposing of the wood. Otherwise the wood is merely so much waste and has to be left to rot on the ground. Naturally, the yield of a wattle plantation will depend on the age and growth of the trees. If the trees are planted at 6 feet apart there will be 1210 per acre; at 10 feet apart, 435. Sutton states that it is safest to estimate at the rate of 500 trees per acre. At 30 lb. of wet bark per tree this would equal 15,000 lb. or say 10,000 lb. of dry bark per acre, viz., nearly 1½ tons, which at £6 per ton would give £27 per acre. Australian authorities estimate the yield at from £35 to £45 per acre. In either case it is sufficient to show what profits are likely to accrue from several hundred acres under wattles. The area under wattles in Natal is now computed to be 130,000 acres.

The stoppage of indentured coolie labour has been felt by the wattle industry, but the farmers of Natal are rapidly adjusting themselves to the changed conditions. It is true, also, that wages are rising, yet the industry to-day is well able to stand the increased cost of production. During our recent tour through the Province, for the purpose of studying the progress of the industry, we were struck by two things: (1) The increasing use of labour-saving devices, and (2) the combination of wattle growing with dairy farming. The Natal farmer is importing pedigree cattle from England to graze on the paspalum paddocks, which he had laid out between the plantations, which form admirable shelter belts for live stock. Formerly, it was supposed that wattle growing injured the land for ordinary farm crops. Experiments have proved that this idea was entirely erroneous; and excellent crops of maize have been harvested on land that has just produced a heavy stand of wattle timber. This fact is most important, because in the case of a fall in the price of wattle bark, due to the discovery of some chemical for tanning purposes, it would enable the planter to turn his estate into an agricultural or dairy farm without any material loss.

We believe this industry has a great future. The quick growth of the tree, the high percentage of tannin contained, and the low cost of production give the wattle growers of Natal great advantage over growers in other countries. But certain improvements are urgently needed, as follows:—

A regular supply of good bark must be assured for the tanneries of Great Britain. (2) That only sound, mature bark is exported and properly graded with a Government certificate. The good name of Natal must never be impugned by bad packing, damaged or adulterated bark. (3) More co-operation is required between the growers themselves and their agents in London and Durban. (4) The wattle

industry needs more advertisement in the British markets. For Imperial reasons it does seem lamentable that the Union should allow Germany to control and absorb practically the whole of the output of a British Province. Hear what Mr. W. J. S. Newmarch, of Harden Heights, recently said on this matter:—"As you are aware, the dry bark is put into sacks. These sacks must weigh exactly 198 lb. gross weight. Should any sack weigh over 200 lb. the Hamburg buyers claim a reduction of 5s. per ton. I had to pay £3. 15s. on a recent consignment because a few of my sacks went above 203 lb. This is an absurd penalty brought about by the monopoly of the Hamburg market."

At the present time the wattle market is being manipulated by speculators, both in South Africa and Europe, like the wheat market of America. Nevertheless, Natal is the only country in the world supplying wattle bark on a large scale.

Wattle growing has raised the price of land in many parts of Natal, just as if some new township had suddenly sprung into existence. Besides the use of bark for tanning, large quantities of poles are sent from Natal to the Rand mines for pit-props, and firewood to many parts of the Free State. Special low rates are allowed on the railway for both poles and firewood. A new industry has sprung up in boxmaking. Formerly the raw bark was used in the tan pits. Nowadays the tanner employs tannic acid in the form of a liquid extract from the raw material. It would be well if a wattle extract factory could be erected in Natal, and the profits of the industry kept in the Province. It is estimated that such a factory would cost £50,000. Moreover, it is probable that the present system of packing in sacks will be given up in favour of compressed rectangular packages, thus effecting a great saving in shipping space. In a word, the wattle farmer of the future must be a world farmer.

It will be interesting to show the progress of the wattle industry by means of a few figures:—

| | | | Value. |
|---|---|---|---|
| 1886 ... | 39 | packages ... ... | £11 |
| 1896 ... | 3,378 | tons ... ... ... | 16,450 |
| 1906 ... | 14,820 | tons ... ... ... | 89,443 |
| 1912 ... | 59,103 | tons ... ... ... | 283,010 |

**Records of Progress.**

The modern State may in some ways be likened to a business organization, a manufacturing or trading concern, or, to make a comparison which will be more familiar to our readers, an agricultural holding. To arrive at an understanding of his financial position—and so gain some idea of his progress towards prosperity—the business-like farmer must ask himself three questions: (1) What do I produce? (2) What do I sell? and (3) What do I buy? His farm will only produce certain commodities. A portion of these he utilizes on his farm, the balance he sells, and with the proceeds he is able to purchase other commodities which he requires but which he is unable himself to produce. Regard South Africa as a huge farm, and the parallel will be plain. Here we produce a certain range of commodities.

Some of these we produce in excess of our requirements, the balance of which we sell (i.e. export) to pay for our shortcomings in respect of other commodities of which we produce either not enough for our own requirements or none at all. But without proper records we cannot tell how we stand, any more than can the farmer himself in his own case. Adequately, therefore, to gauge the progress of a State, we must know the extent of its productions, the quantities thereof sold (i.e. exported), and the quantities of commodities purchased from other States, i.e. imported. And in order that these records may be of practical value they need to be published at frequent intervals.

In South Africa the practice is to publish monthly and annual statements of imports and exports, and these alone are very useful in enabling us to gauge our progress. But they are not sufficient. We must also know what we are producing. It is not sufficient to know that we exported in, say, the year 1911, 1,032,770 muids of maize, and 2,614,200 lb. of maize meal, valued together at £409,388. These figures simply show us what increased wealth was brought into the country by the sale of certain grain. They do not give us any idea of another important consideration, namely, the sum of money which is retained in the country by the filling of our own maize requirements. It is one thing to be told we sold oversea a little over a million muids of maize in 1911; it is another matter to learn that our total production that year was eight and a half million muids.

**The Value of Statistics.**

Look at the matter from another point of view. In 1911 we imported four million pounds of butter; and we therefore know how much more we must produce ere we can say that we are self-supporting so far as this particular necessity of life is concerned. Yet we are in the dark as to what this really involves until we know what we are already producing in the country; whilst when we have records over a series of years we can also form a tolerably good idea of the ratio of our progress. If we were told that our present production of butter was four million pounds per annum, we should see that, to become self-supporting in this direction, we should need to double our output—a very different matter from an increase of 50 per cent. on our output, which would be the case were we producing eight million pounds. When we learn, however, that in 1911 we produced just under eleven and a half million pounds the matter presents a still better aspect.

From these brief considerations we gain some little idea of the value of annual agricultural statistics; but there are other reasons which more closely concern the farmer. The industries connected with the land must always be the ones upon which the majority of the inhabitants of this country will have to depend, and reliable information relating to their extent and progress is of vital importance to farmers as well as to persons engaged in other pursuits. It is, essential, for example, that large employers of labour, such as the mining companies, should know what the prospects are of obtaining locally the foodstuffs they require without having to resort to the

overseas markets; and the merchants should have available data as to the agricultural prospects in the various parts of the country, which will enable them to forecast the probable expansion or restriction of farmers' demands for general merchandise according to the nature of the season; whilst the shipping companies need to know the prospects of the main crops in which an export trade is done in order to arrange for the provision of the requisite hold accommodation. Besides the direct advantage that must be secured to farmers by the publication of information as to the quantities of produce likely to be available for the market and the consequent knowledge of the prices that will probably be obtainable, the fact of being called upon periodically to furnish returns naturally leads them to keep more complete records of the results of their farming operations than has been done by some of them in the past. This in itself is an advantage to the farmers themselves.

**Collection of Agricultural Statistics.**

Bearing these facts in mind, it is interesting to note that next year will witness the first complete collection of statistics relating to farming within the Union of South Africa that has ever been made, as a distinct and complete organization apart from the general Census of 1911; and that thereafter the work will be undertaken annually. A Department of Statistics is now being organized, which will include an Agricultural Division charged with the collection and publication of data relative to the live stock and agricultural industries of the Union. For ascertaining actual results of farming operations, the Department will have to depend on returns from individuals; whilst in regard to forecasts of crops it is proposed to obtain periodical reports from various officials throughout the country, and to ask a few farmers in each district to undertake to furnish reports on crops in the areas in their immediate neighbourhood. Every effort will be made to reduce to a minimum the clerical labour involved in making such reports; and the Government confidently relies upon the public spirit of leading farmers throughout the Union to assist in this important section of the work. This system has been in operation with success in the United States of America, where over thirty thousand correspondents gratuitously furnish reports every month to the central Bureau of Statistics attached to the Agricultural Department at Washington.

So far as the different crops are concerned it is only proposed to collect statistics of actual results and to ask correspondents to furnish crop reports in districts in which a crop is grown to a considerable extent. Every five years complete returns for each crop for every district in the Union will be asked for.

It will later be seen that returns of quantities of seed sown are to be asked for and not areas under cultivation. The collection of statistics under the latter system has not been found to be altogether satisfactory, and instead of asking farmers to state the areas, it is proposed to arrive at these from the quantities of seed sown, after ascertaining in each district the quantity of seed ordinarily allowed per morgen or per acre.

**A Mistaken Idea.**

In many parts of South Africa there has never hitherto been an annual collection of agricultural statistics. It is therefore probable that many of the farmers in those areas—as well as some in areas accustomed to the furnishing of annual returns—will regard the work which is now to be undertaken in a suspicious light. In the minds of not a few farmers the furnishing of private information in regard to their activities is inseparable from the idea of taxation. Experience has shown that this notion is not by any means uncommon. The idea that such information may be needed in connection with the framing of taxation is excusable in those who have but little idea of the system adopted in the collection and publication of statistical data. As a matter of fact the farmer need have no fear. The individual schedules sent in by farmers are regarded by the statistician and his staff as strictly confidential—confidential not only as against private individuals but as against other public offices as well. The agricultural statistician treats the farmer sympathetically: he asks his confidence and does nothing to abuse it. In this connection readers may be interested to learn that in the Bill which has been drafted for the purpose of giving effect to the Government's proposals in regard to the collection of statistics—which will be brought before Parliament during the forthcoming session—there is a clause prescribing heavy penalties for the divulging by officials of any information contained in the individual farmers' schedules.

Once the individual figures are tabulated their identity is completely lost. The Statistical Department, the Government, the political economist, and the general public are only concerned with totals—totals for Districts, Provinces, and the Union. Individual figures are valueless. Even the totals for a District or Division are of small importance as compared with the totals for Provinces or for the Union.

We have just said that individual figures are valueless. We should qualify this statement, adding that they are valueless standing singly, but they are all most necessary in order to enable a just notion to be gained of the extent of farming operations in this country. We hope that every farmer will rise to the occasion, do his best to furnish accurate returns, and heartily co-operate with the Satistical Department. The work of this new Department will be of great importance to the general public, but its work cannot be of the fullest value unless the farmers themselves, instead of harbouring feelings of distrust and suspicion, do their best to co-operate for the common weal of the country at large.

# The Nature of Fungi, with reference to the Life-histories of Some Important Parasites.

By Paul A. van der Byl, M.A., Mycologist, Division of Botany.

The term fungi comprises a large assemblage of plants, and includes the following popularly known forms: (1) *Mushrooms*, applied chiefly to the edible field mushrooms; (2) *toadstools*, mushrooms other than the above, all of which are considered poisonous by the majority of people; (3) *rusts*, *smuts*, and *mildews*, forms well known to the majority of farmers, which attack various fruit trees, cereals, vegetables, etc.; (4) *moulds*, applied to minute forms which occur frequently on various articles of food, preserves, etc.

Needless to say the above terms are used very freely. They include fungi of different form and structure, and the terms as popularly used convey little meaning to the *mycologist* or student of fungi.

Fungi are plants which contain no chlorophyll, the green colouring matter to which all green plants owe their colour. Chlorophyll plays an important part in all green plants, in that it is associated with the process of building up complex plant food from simple substances obtained from the soil and from the atmosphere.

Since fungi contain no chlorophyll, they are unable to provide for themselves, and hence are dependent on other plants or on animals for a subsistence. Where fungi grow on and obtain nourishment from the remains of dead animal or vegetable matter, they are said to live *saprophytically*, and are known as *saprophytes*. Common examples are: Many fungal growths on dead tree stumps; the moulds frequently found on preserves and various articles of food; the common edible mushroom and other mushroom forms often found on rich humus soils.

The class of fungi which to some extent or other concerns economically practically every farmer, is that the forms of which live on living animals or plants. They are said to lead a *parasitic* existence, and are included in the term *parasite*.

Parasites naturally obtain their food from the host in or on which they live, i.e. they make use of and thrive on the food manufactured by the host for its own use; they lead a poaching life. Frequently parasites secrete substances poisonous to their hosts; as often as not they impede the proper development of their hosts and frequently are responsible for their death.

Some fungi start life as saprophytes, and, later, become most dangerous parasites; others, again, start life as parasites and, after they have killed their host, they thrive on the dead remains, i.e. they are now saprophytes. A sharp distinction between saprophytes and parasites is, therefore, not always possible.

In dealing with fungi we must distinguish the part which obtains nourishment for the fungus, i.e. the *vegetative part*, from that which serves to perpetuate and spread the fungus, i.e. the *reproductive part*.

## VEGETATIVE PART OF FUNGI.

The vegetative part of a fungus is known as a *mycelium*. In by far the majority of cases this mycelium is composed of a greatly branched system of delicate filaments or threads termed *hyphae*. These threads may be colourless or coloured a dark brown; again, they may be septate or non-septate.

In saprophytes the mycelium ramifies through and on the dead vegetable or animal matter on which the fungus may be growing, and from it absorbs nourishment.

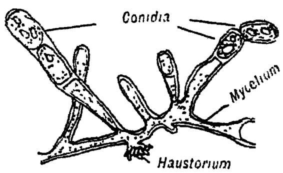


Fig 1 (after Bioletti).—Vine Mildew (*Oidium tuckeri*), showing Mycelium, Haustorium, and Conidia. Highly magnified.

In the parasitic forms there are some interesting modifications which may well be considered. Probably every person who has vines has at some time or other been troubled with a disease commonly known as "powdery mildew," or "oidium." This trouble is caused by a fungus (*Oidium tuckeri*) whose white mycelial strands ramify and spread over the affected parts but do not enter the host. To obtain nourishment the mycelium sends out small sucking organs or *haustoria* into its host (Fig. 1). By means of these haustoria the fungus absorbs from its host food materials manufactured for its own use.

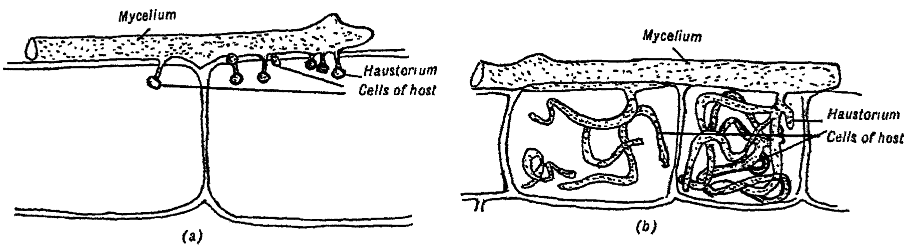


Fig. 2 (after De Bary).—Haustoria of Parasitic Fungi, (*a*) *Albugo candida*, (*b*) *Peronospora calotheca*. Both highly magnified.

In other fungi the mycelium is right in the tissues of the host plant. In these cases the hyphae either penetrates into the cells of the host and thus directly absorb nourishment, or the hyphae are limited to the air-spaces between individual cells of the host and give out haustoria into the cells themselves (Fig. 2). Through these haustoria, again, food is taken from the host, and this food goes to nourish the fungus.

Where a mycelium lives in and penetrates in the host, its presence can, of course, only be made out with the aid of a microscope. A microscope is, however, not always necessary to show the presence of even these "internal" forms, for in fruiting the fungus in some form or other becomes visible even to the naked eye.

The "brackets" frequently seen on many tree stumps are simply the fruiting bodies of a fungus whose mycelium is right inside the stem from where it absorbs nourishment.

The small black spots or dots so often visible in discoloured areas of leaves (Fig. 3) are the fructifications of some fungus whose mycelium may be right inside the leaf tissue.

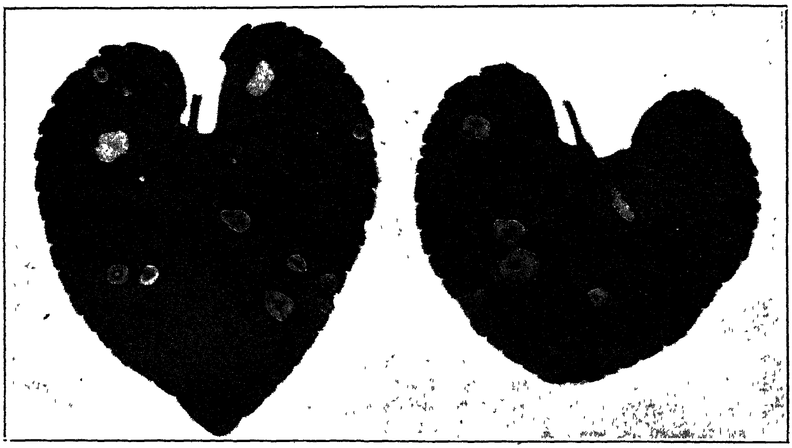


Fig. 3.—Photograph of Violet Leaves suffering from attack of Leaf Spot Fungus (*Cercospora violae*).

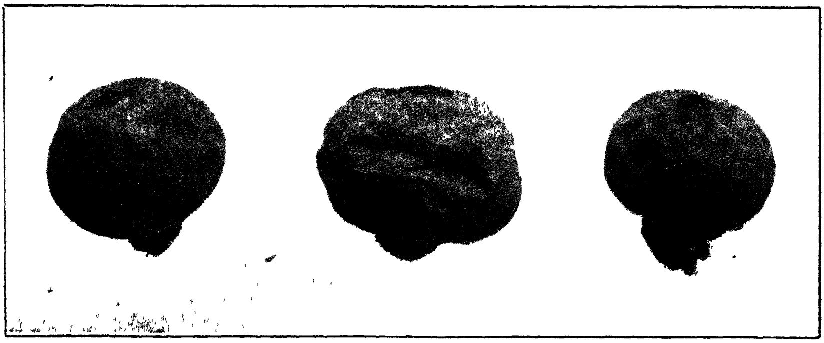


Fig. 4.—Photograph of "Puff-balls" (*Lycoperdon* sp.).

The so-called "mushrooms" are in reality nothing less than the reproductive portion of a fungus whose mycelium ramifies in and obtains nourishment from the rich humus soil on which these forms occur so frequently.

A microscope is, therefore, not always essential to prove that plants are suffering from a fungus attack. Those fungi growing on the surface are readily visible to the naked eye. In addition to the one mentioned, there are many dark coloured fungi frequently found on leaves, especially in dense wood, in which, too, the mycelium is

superficial and nourishment is obtained through the aid of haustoria. The fungi living right inside some plant organ have to come to the surface in order to fruit and in order that there may be a fair chance of distributing its reproductive bodies. We now proceed to the way fungi reproduce and perpetuate themselves, and in connection therewith will describe the life-cycles of some particular types.

### REPRODUCTION OF FUNGI.

Fungi reproduce themselves by means of minute microscopic bodies known as *spores*.

When next you happen to come across a ripe "puff-ball" (Fig. 4), break it open; you will notice a dark central mass—a dark "smoke" will rise from it if it be perfectly ripe. This inner dark mass and also "the smoke" is made up of millions of spores of the

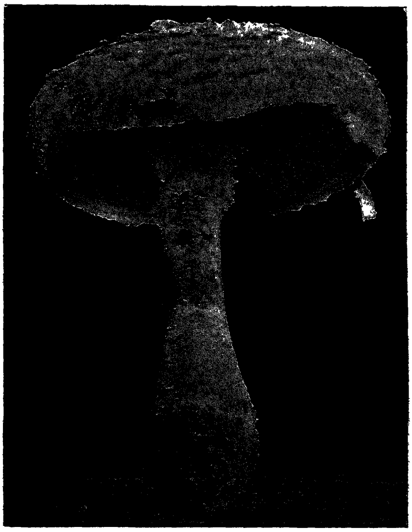


Fig. 5.—Photograph of a "Gill-fungus" (*Amanita solitaria*).

fungus. Under favourable conditions these spores germinate and produce a mycelium on which ultimately the fruiting body or "puff-ball" will be formed.

Again, you may obtain a ripe mushroom (Fig. 5), remove the stalk and place the "cap" with gills downwards on a sheet of paper; soon a fine powder will have collected under the "cap." This powder again is made up of the spores of the mushroom. In the spore print formed as above, you will notice that the spore-masses are arranged in rows and that these rows correspond to the gills, this would suggest that the spores are borne on the gills and we will see later that such is actually the case.

The spores of fungi serve the same purpose which seeds do in the higher plants, viz., the perpetuating of the race.

Spores vary greatly in size, colour, number of compartments, and method of formation. In most cases they are minute bodies, a single one of which would not be visible to the naked eye. To determine

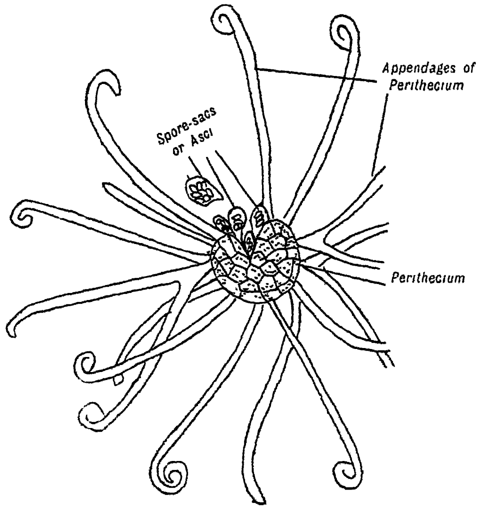



Fig. 6 (after Bioletti).—Perithecium of Vine Mildew (*Oidium tuckeri*). Highly magnified.

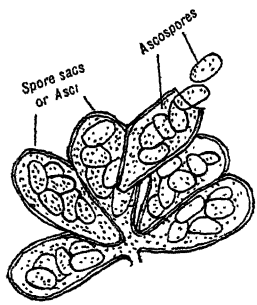



Fig. 7 (after Bioletti).—Group of Asci of *Oidium tuckeri*, removed from Perithecium. with Ascospores. Highly magnified.

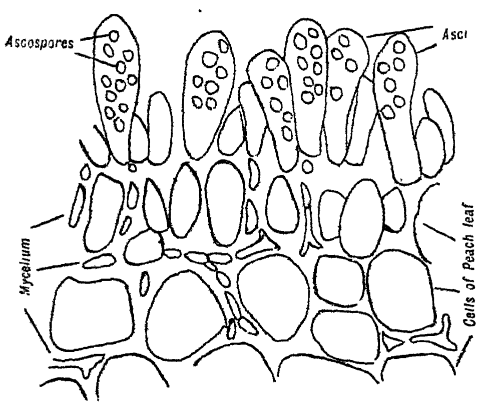



Fig. 8 (from Bull. 276 of Corn. Un. Agr. Exp. Stn.).—Transverse Section through a Peach Leaf infected with Peach Leaf Curl Fungus (*Exoascus deformans*). Highly magnified.

fungi the presence of spores are essential, because in practically all cases the mycelia do not provide distinguishing characters. The classification of fungi is largely based on the nature of these spores; their method of formation, size, colour, number of compartments, etc. Spores receive definite names based mainly on their method of formation.

In the vine mildew fungus (*Oidium tuckeri*) certain branches of the mycelium grow erect and abstract in chains the reproductive bodies or spores, here termed *conidia* (Fig. 1). Towards the end of the season this fungus forms small dark bodies visible to the naked eye on the leaf surface. In these dark bodies known as *perithecia* (Fig. 6) there are borne a number of sacs of *asci* and in these asci are eight spores known as *ascospores* (Fig. 7).

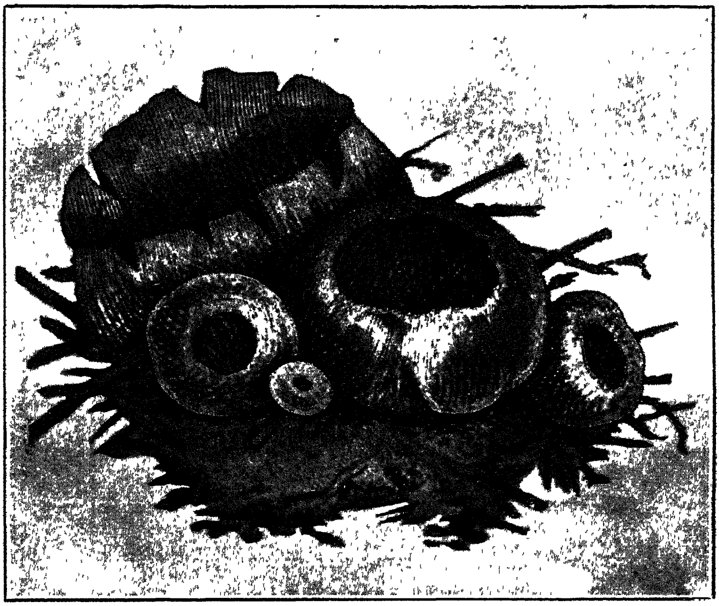


Fig. 9 (from Massee's Plant Diseases).—A group of "Cup Fungi" (*Peziza vesiculosa*).

The conidia serve to spread the fungus rapidly. They are readily blown about by the wind, alight on healthy plants where under favourable conditions they germinate and give rise to the white mycelium so characteristic of this fungus. On this mycelium conidia are again formed which spread the disease in a manner similar to that described.

The ascospores borne in a hard case, the perithecium, are more resistant, and in this form the fungus passes the winter. With the decay of the perithecium the ascospores are liberated; blown by the wind on to healthy vines they there germinate the season after their formation and thus again start the disease.

The perithecia of this particular fungus has up to the present not been found in South Africa, and vine growers will do well to keep a look out and submit to us any they may come across.

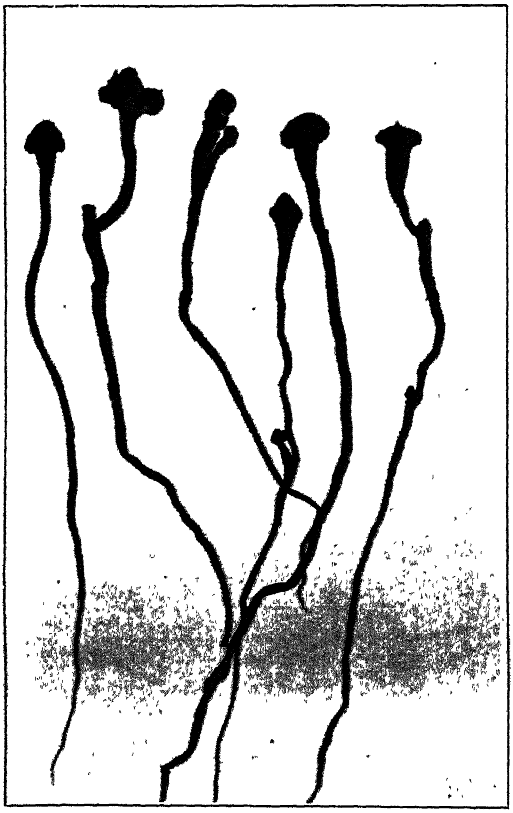


Fig. 10.—Photograph of *Xylaria* sp. found between Carnation Roots.

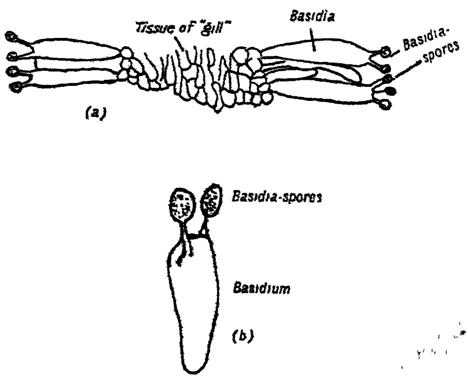



Fig. 11 (From Percival's Agr. Bot.). (*a*) × 450. Transverse Section through Portion of Gill of Common Mushroom (*Agaricus campestris*). (*b*) A Single Basidium.

The group of fungi with spores borne in asci is known as the *Ascomycetes*.

The fungus (*Exoascus deformans*) which causes peach leaf curl also belongs here. Here the asci arise free on the leaf surface (Fig. 8). In other ascomycetes again the asci are borne in conceptacles with a distinct apical opening through which the spores can escape, or at maturity the asci become more or less completely exposed in the conceptacles, as in the common "cup fungi" (Fig. 9).

Again, the asci may occur in conceptacles on a firm vegetative body or *stroma*. Fig. 10 shows the stroma of a fungus (*Xylaria* sp.) found growing between carnation roots. The upper swollen portion is

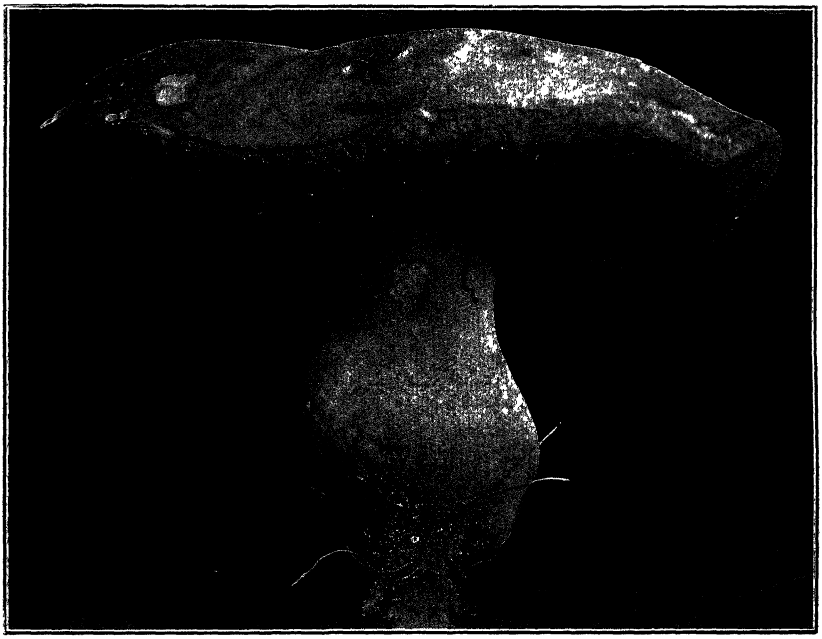


Fig. 12.—Photograph of a "Pore Fungus" (*Boletus* sp.).

pierced by numerous pores which lead to the conceptacles in which the asci are borne.

In another large group of fungi the spores are abstricted from special spore-bearers or *basidia*. This group is known as the *Basidiomycetes* and the spores are termed *basidiospores*. We will consider a few of the better known fungi belonging here.

*The Common Mushroom* (Fig. 5).—In the mushroom the part above ground is the fructification and is made up of a stalk and a "cap." On the under side of the "cap" are a number of gills, and on these gills are the spore-bearers or *basidia* on which the spores known as *basidiospores* are borne (Fig. 11). These spores on germinating in a suitable substratum produce a mycelium on which ultimately fructifications are borne. The so-called *spawn* of mushrooms is simply the vegetative mycelium growing in a well nourishing substratum. When

this "spawn" is planted the mycelium continues its growth and ultimately forms fructifications above ground. These "gill-fungi" constitute the group *Agaricales*.

*The Pore-fungi.*—Probably you have often come across fungi on tree stumps or elsewhere, whose one surface is pierced by numerous small holes or pores. Fig. 12 represents a fruiting body resembling that of the common mushroom, but with this difference, that in place of gills there are numerous small pores on the under surface. In these pores are borne the basidia which again bear the basidiospores

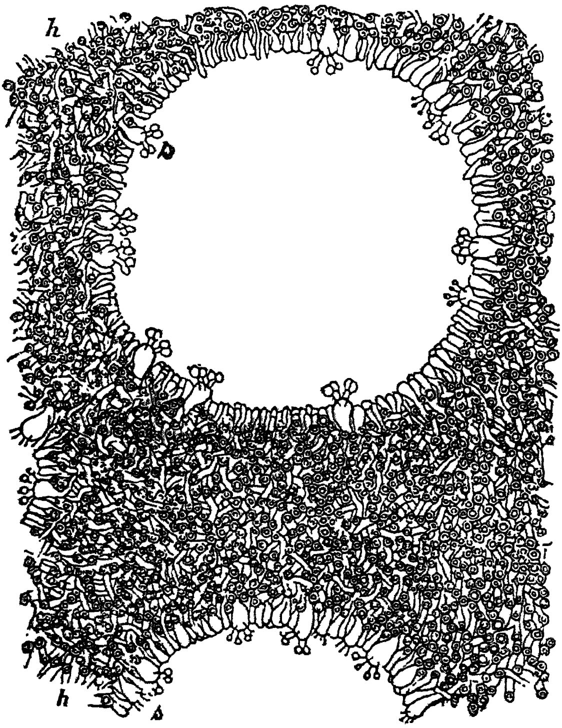



Fig. 13 (from Warming-Potter's Syst. Bot.)—*Polyporus igniarius.* Section through the under side of the Fungus; *h–h* is hyphal-tissue between the tubes, formed by irregularly felted hyphæ, many of which are seen cut across; *s* is the hymenium which covers the walls of the tubes, and from which the basidia with the spores protrude.

(Fig. 13). This particular fungus (*Boletus* sp.) is common under pine trees in the Cape Province. Many of the "brackets" so common on tree stumps (Fig. 14) and even occurring on living trees also belong here. The "pore-fungi" are collected together in the group *Polyporeae*.

The somewhat complicated fructifications of "gill" and "pore-fungi" is, like every other fungal organ, entirely built up of hyphae. These hyphae are either closely packed or they are more loosely arranged, so that individual threads are easily distinguished and large air spaces are left between them.

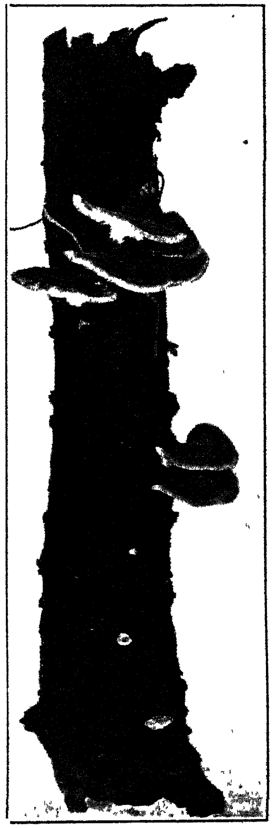


Fig. 14.—Photograph showing "Brackets" (*Polystictus versicolor*) on Wattle Stump.

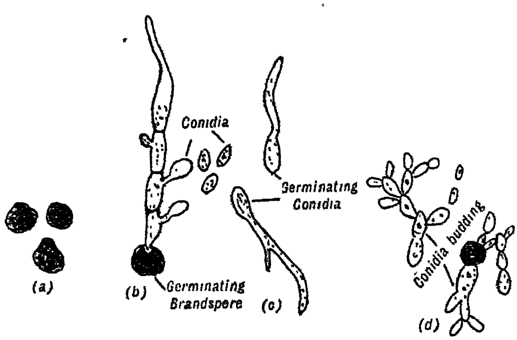



Fig. 15.—Oak Smut (from Percival's Agr. Bot.).
(*a*) Brand Spores. (*b*) Germinating Brand Spore with Conidia. (*c*) Conidia germinating in Water. (*d*) Budding of Conidia. (Enlarged about 500 diam.)

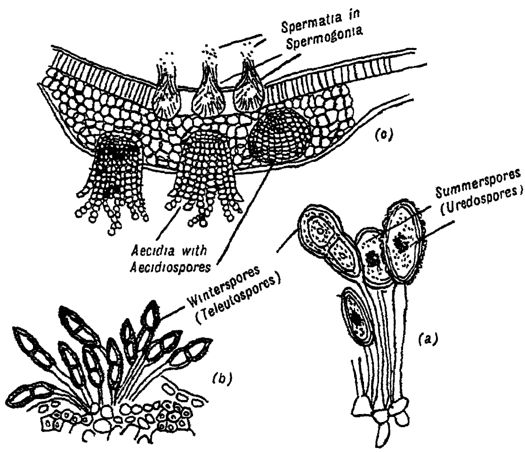



Fig. 16 (From Warming-Potter's Syst. Bot. and Scott's Struct. Bot.).
(*a*) × 300. Part of Sorus showing several Summerspores and one Winterspore. (*b*) Sorus of Winterspores. (*c*) Aecidia and Spermogonia on Barberry Leaf. (*b*) and (*c*) Highly magnified.

Fig. 17.—Photograph showing Rust Pustules (*Puccinia graminis*) on Wheat.

*Smuts.*—The term "smut," as commonly used, is applied to cases where the grains of cereals are replaced by a loose dark powder resembling soot. The mycelium of these smut fungi lives right in the tissues of the host. Infection usually takes place while the plants are still small and the mycelium then wanders in the tissues of its host until it reaches that part of the plant where the spores are to be formed. There are a number of fungi which cause "smut" in different plants. Here only the one (*Ustilago avenae*) responsible for smut in oats will be considered.

The sooty powder which replaces the seed is composed of millions of dark, thick-walled, and resistant spores often termed *brandspores* (Fig. 15A). These brandspores either fall to the ground or they are harvested with healthy seed. The spores sown with healthy seed, as

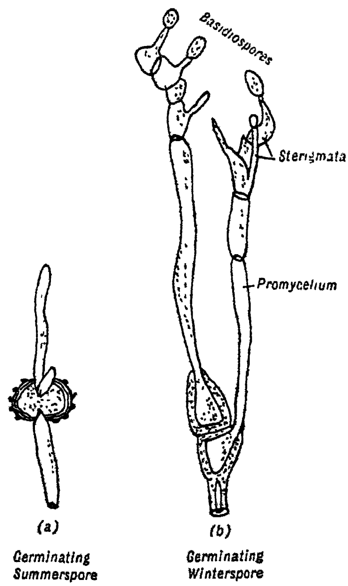



Fig. 18 (from Scott's Struct. Bot.).—Rust Fungus (*Puccinia graminis*).
(*a*) Germinating Summerspore (×300). (*b*) Germinating Winterspore (×230).

also those in the soil, germinate and form a short hyphae on which conidia are borne (Fig. 15B). These conidia infect the germinating seedlings which when mature are again "smutted." In solutions of dung, etc., these conidia sprout and produce secondary conidia (Fig. 15C), which too may cause infection. The brandspores which are eaten by animals with the hay and grain passes into the dung and without doubt give rise to a rich crop of these secondary conidia. Feeding "smutted" material to animals therefore means propagating the disease causing fungus and should be discouraged.

*Rusts.*—We will limit ourselves to the rust fungus of wheat (*Puccinia graminis*), and since its life-cycle is extremely interesting will treat it somewhat in detail.

The brown dust evident on rusted wheat in early summer is the summer spores or *uredospores* of a fungus (*Puccinia graminis*) whose mycelium is right in the leaf tissue. These summer spores (Fig. 16)

are borne in definite pustules (Fig. 17) and are produced for a period of six to ten days. Each spore when carried by the wind or by insects to a healthy plant germinates (Fig. 18) and again produces the disease. This form of reproduction is continued during the greater part of the summer.

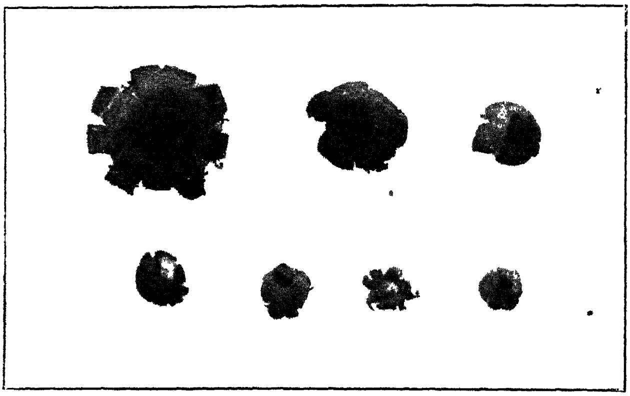


Fig. 19.—Photograph of "Earthstars" (*Geaster* sp.).

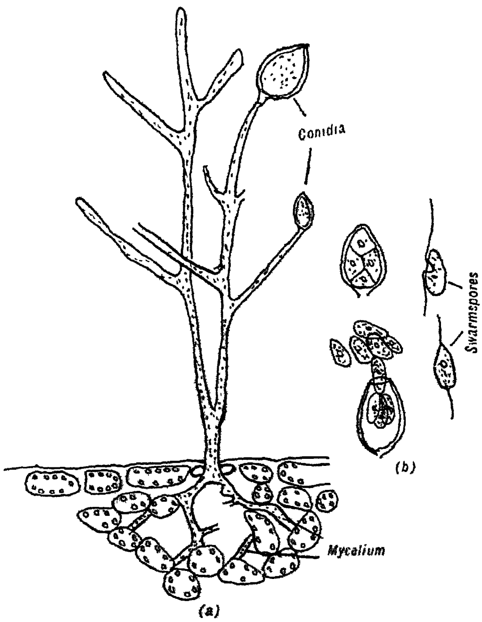



Fig. 20 (from Warming-Potters' Syst. Bot.).
(*a*) Transverse Section through a Potato Leaf suffering from Blight (*Phytophthora infestans*). (*b*) Formation of Swarmspores in the Conidia. (Strongly magnified.)

Towards the end of summer the summer spores are replaced by spores of a different kind, the winter spores or *teleutospores* (Fig. 16B). Coincident with this the colour of the pustules become darker.

The winter spores differ from the summer spores in being more resistant and in being composed of two cells (Fig. 16B). They remain

dormant till spring, when, conditions being favourable, a hypha (basidium) develops from each half (Fig. 18B). These basidia are usually divided in their upper region into four cells, each of which produces a delicate outgrowth on the ends of each of which a spore, the *basidiospore*, is abstricted.

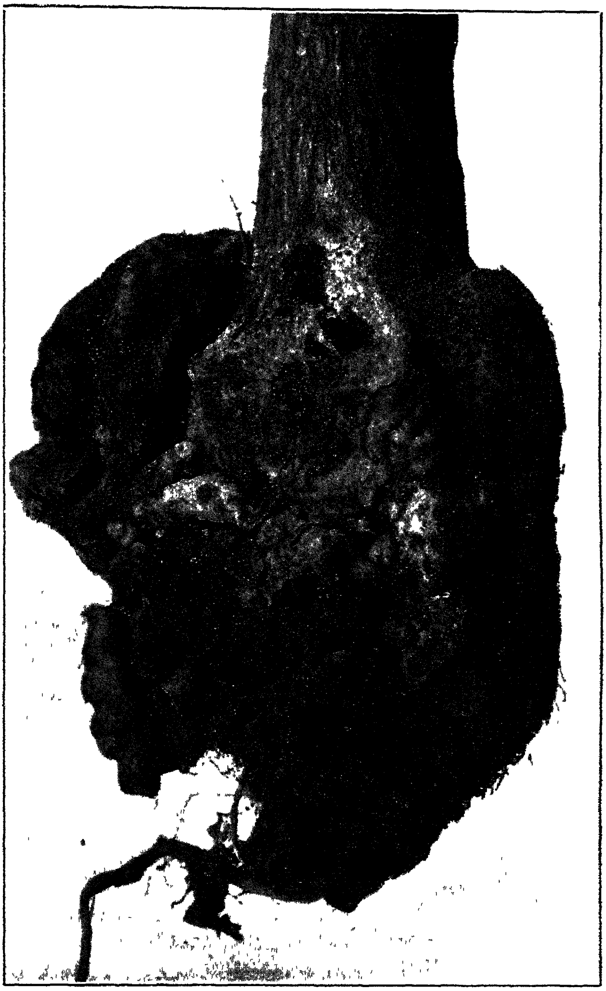


Fig. 21.—Photograph of Cabbage suffering from "Dikvoet" (*Plasmodiophora brassicae*).

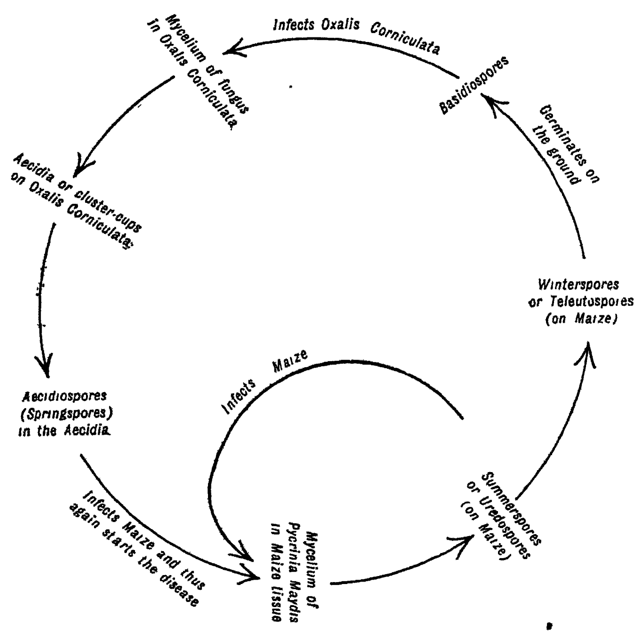
These basidiospores appear unable to infect wheat plants. For germination another host is necessary. This host in England is the barberry; in South Africa this intermediate host has to the present not been found and farmers will assist greatly if they will be on the lookout for it.

On the barberry the basidiospores readily germinate; infect the plant; and on it produces two different kinds of spores: (1) On the

lower surface of the leaves are formed clusters of small cups. Each cup is termed an *aecidium* and the spores formed in them are known as *aecidiospores* (Fig. 16c). (2) On the upper leaf surface spores known as *spermatia* are produced in pear-shaped structures (Fig. 16c). These spermatia at present appear functionless and therefore need not be further considered.

The aecidiospores are unable to infect a barberry leaf, but when placed on wheat plants infection readily follows and summer and winter spores are again produced.

Mr. Pole Evans has shown that the aecidiospores of the fungus (*Puccinia maydis*) causing rust in maize in South Africa is produced on a sorrel (*Oxalis corniculata*). In order to make the somewhat complicated life-cycle of these rusts clearer we may represent the life-history of this particular fungus thus:—




Not all the "rusts" exhibit such a complicated life-history. A few have all the spore forms on the same host, and in others one, two, or even three of these spore forms are as yet unknown.

Other fungi belonging to the *basidiomycetes* and of frequent occurrence are the following popularly known forms: (1) Puff-balls (Fig. 4); (2) "Earth-stars" (Fig. 19); (3) "Paapies" (*Podaxon* sp.) (Fig. 25).

We have now considered two of the three main groups of fungi. These two groups constitute the *higher fungi*. The other group known as the *Phycomycetes* is regarded as more primitive and differ from the higher fungi in (1) an unseptate mycelium; (2) the spores are either conidia or again a number of spores may be formed in a *sporangium* or spore-containing vesicle; (3) motile spores absent in the higher fungi are here of frequent occurrence.

The fungus (*Phytophthora infestans*) causing potato blight belongs here, and as it is of frequent occurrence we will consider its life-history somewhat fully.

Fig. 20 shows (1) the mycelium of the fungus inside the leaf tissue; (2) through one of the stomata or breathing pores two structures, the conidiophores, have grown and on these are borne the *conidia*.

These conidia are readily detached, find their way to a healthy plant where they germinate and cause infection. Again, the conidia

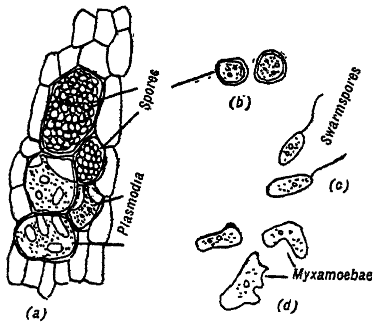



Fig. 22 (after Percival's Agr. Bot.).
(*a*) × 80. Transverse Section through portion of Clubbed Tissue of a Cabbage Root, showing Plasmodium of "Dikvoet" Fungus and Spores. (*b*) Two Ripe Spores formed inside Root. (*c*) Swarmspores. (*d*) Myxamoebae, later stage of (*c*). (Enlarged about 950 diam.)

may, especially in moist weather, form a number of motile spores, *swarmspores* (Fig. 20B). These swarmspores washed on or blown on to healthy plants germinate and thus spread the disease. It is evident that the formation of swarmspores enables the fungus to cause far more damage than it would if only conidia were to germinate, because in the former case a larger number of disease-producing spores are at the disposal of the fungus. This fact accounts for the greater virulence of the disease in moist weather.

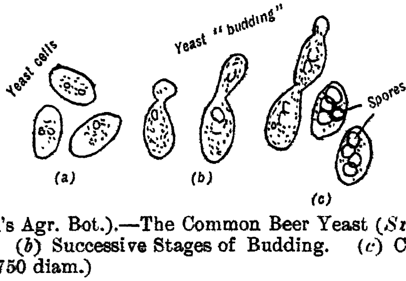



Fig. 23 (from Percival's Agr. Bot.).—The Common Beer Yeast (*Saccharomyces cerevisae*). (*a*) Single Cells. (*b*) Successive Stages of Budding. (*c*) Cells containing Spores. (Enlarged about 750 diam.)

As the conidia may produce spores inside it we may look upon it as being of the nature of a *sporangium* or spore-containing vesicle. A sporangium differs from an ascus in that whereas an ascus has a definite number of spores a sporangium has an indefinite and frequently very large number.

This fungus forms *resting spores*; these originate by a sexual process and form the source of infection the following season.

Another fungus belonging here is one (*Saprolegnia ferox*) which lives as a saprophyte on organic remains in water, but frequently makes its appearance on living animals, being frequently found on young trout in rearing establishments. Trout killed by this fungus are easily recognized since white fungus threads grow out of them.

Mention must still be made of two groups of fungi, viz., the *Slime-fungi* or *Myxomycetes* and the *Yeasts* or *Saccharomycetes*.

*Slime-fungi.*—The vegetative body of the slime-fungi is somewhat different from the ordinary mycelium of fungi. It is simply a naked mass of living matter, *protoplasm*, and is termed a *plasmodium*. The reproductive bodies again are spores often borne in very nice little sporangia. Slime-fungi are common in damp places where their sporangia are often found on decaying branches, leaves, etc.

One of the slime-fungi (*Plasmodiophora brassicae*) is responsible for the disease known under the names of "club-root," "finger-and-toe disease," "finger-ziekte," "dikvoet," etc. This fungus attacks the roots of various cruciferous plants and causes abnormal growth there (Fig. 21). Recently it has been reported in cabbages from the Cape Province.

The plasmodium lives in the cells and feeds and grows at the expense of food manufactured by the cabbage plant (Fig. 22A). After a time the plasmodium divides and forms a number of spores (Fig. 22A), which when decay of diseased parts take place find their way into the soil. Here the spores germinate and form a motile swarmspore (Fig. 22A) with a single whip-like process or *flagellum*. These swarmspores move about for some time and then lose their flagella, becoming a naked mass of protoplasm which moves by putting out arm-like processes (Fig. 22D). These *myxamoebae*, as they are termed, gain an entrance into young plants by way of the root hairs. Once in they creep from cell to cell, feed on the contents of the cell, and ultimately grow into a large plasmodium again. Probably in some cases a number of myxamoebae may unite to form a single plasmodium.

*Yeasts.*—The yeasts have no true mycelium. The plants in the vegetative state consist of single oval cells (Fig 23A). Each oval cell has the power of multiplying by a process of budding or sprouting (Fig. 23B). Often these buds remain attached to the parent and bud again; this may be continued so that a chain of yeast cells result. Whereas yeast cells bud proliferously when well nourished, they under certain conditions form spores. The living contents in each yeast cell divides and four spores are formed (Fig. 23C). The whole cell therefore becomes transformed into a sporangium, which is considered as a simple form of ascus.

## ECONOMIC IMPORTANCE OF FUNGI.

Saprophytic fungi play an important part as scavengers. To these fungi and certain bacteria are due the processes of decay which we daily see going on around us. But for these fungi and bacteria all the remains of the life of former ages would surround us and make this earth practically uninhabitable. During decay the dead remains of plants and animals are broken up and returned to the soil where they again serve as food for plants, and indirectly for animals.

Yeasts, and in addition other fungi and bacteria, are responsible for various fermentation processes, e.g. alcoholic fermentation, acetic

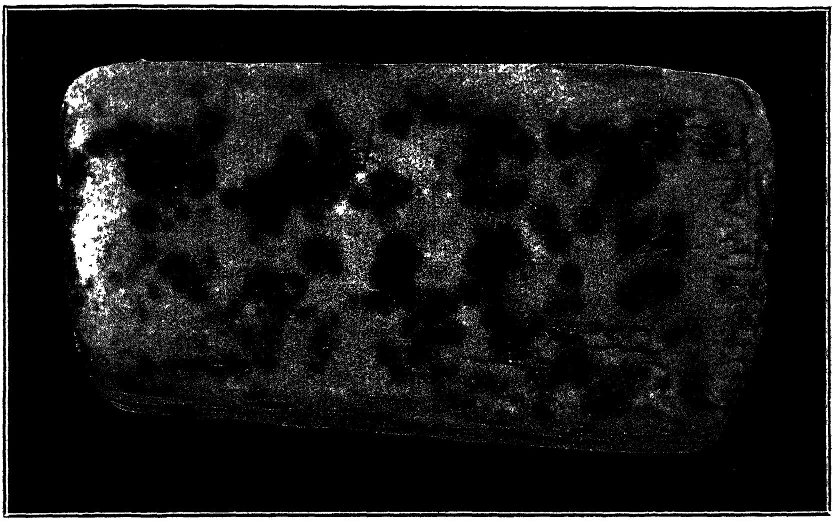


*Photo by J. H. Booysen.*

Fig. 24.—Photograph showing Black Spots in Butter, caused by a Saprophytic Fungus.

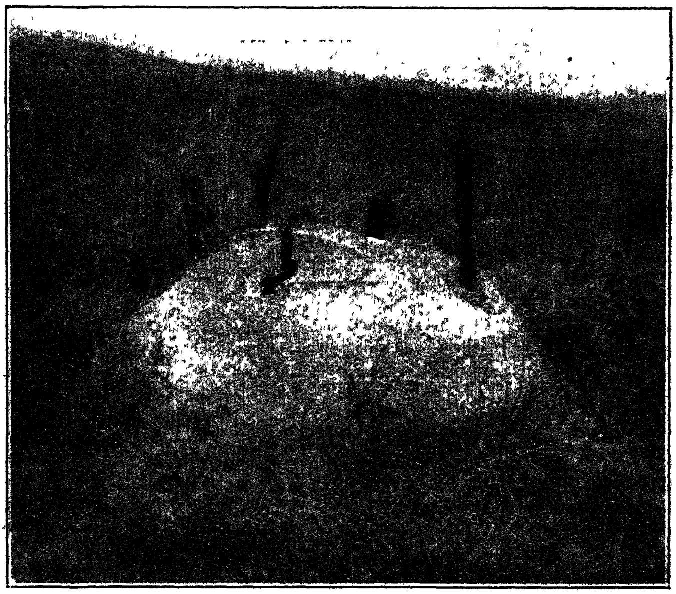


Fig. 25.—Photograph showing "Paapies" (*Podaxon carcinomalis*). This fungus occurs frequently on termite heaps.

acid fermentation, etc. This fermenting power of certain forms is applied in numerous industries.

Some fungi deserve mention as destroyers of insect pests. The fungus (*Isaria psychidae*) attacks the bagworm of the wattle; another (*Empusa musae*) attacks and kills the common house-fly; yet another (*Empusa grylli*), related to the one which is parasitic on the house-fly, attacks and kills locusts.

Many fungi, e.g. mushrooms and others, are edible and are regarded as delicacies.

The usefulness of fungi is, however, more than counter-balanced by the injuries they inflict upon cultivated plants.

Wheat growers have to fight "rusts" and "smuts." Vines have their "mildews," "anthracnose," etc. The potato grower has to put up with "blights," etc. Fruit growers are troubled with "mildews," "scabs," "blights," "shot-holes," "rots," etc.; while market gardeners and nurserymen have various omnivorous parasites trying to gain a living at their expense.

Many fungi (mostly *Colyporeae*) are serious timber pests. Some attack and kill living trees whereas others gain access only afterwards. These fungi are often responsible for serious and troublesome rots.

Many saprophytic fungi which attack various articles of food prove a great nuisance and inconvenience. The cause of a black spot in butter (Fig. 24), which occurred in cold storage at Standerton, is due to an attack of one of these saprophytic forms.

# Tobacco Warehouse Management.

By T. E. ELGIN, Government Tobacco Warehouse Expert of the Tobacco and Cotton Division, Pretoria.

THE tobacco plant thrives in many parts of the world, and tobacco has become one of the principal exports of some of the great agricultural countries.

Revenue collected as excise and import duties enrich the treasuries of many nations, while the tobacco consuming public purchases each year approximately 2,000,000,000 lb. of this commodity. Tobacco is a source of income to many farmers in South Africa, and the area under cultivation is being extended. In South Africa, however, we produce only 1 lb. out of every 145 lb. of the world production of tobacco. Imports of leaf and manufactured tobacco into South Africa show but little decrease each year, which indicates that the consumption of the better grades of leaf in this country is increasing as rapidly as the production.

It is not necessary to mention in this article the methods used in the proper cultivation, harvesting, and curing of tobacco, as bulletins have already been published by the Tobacco and Cotton

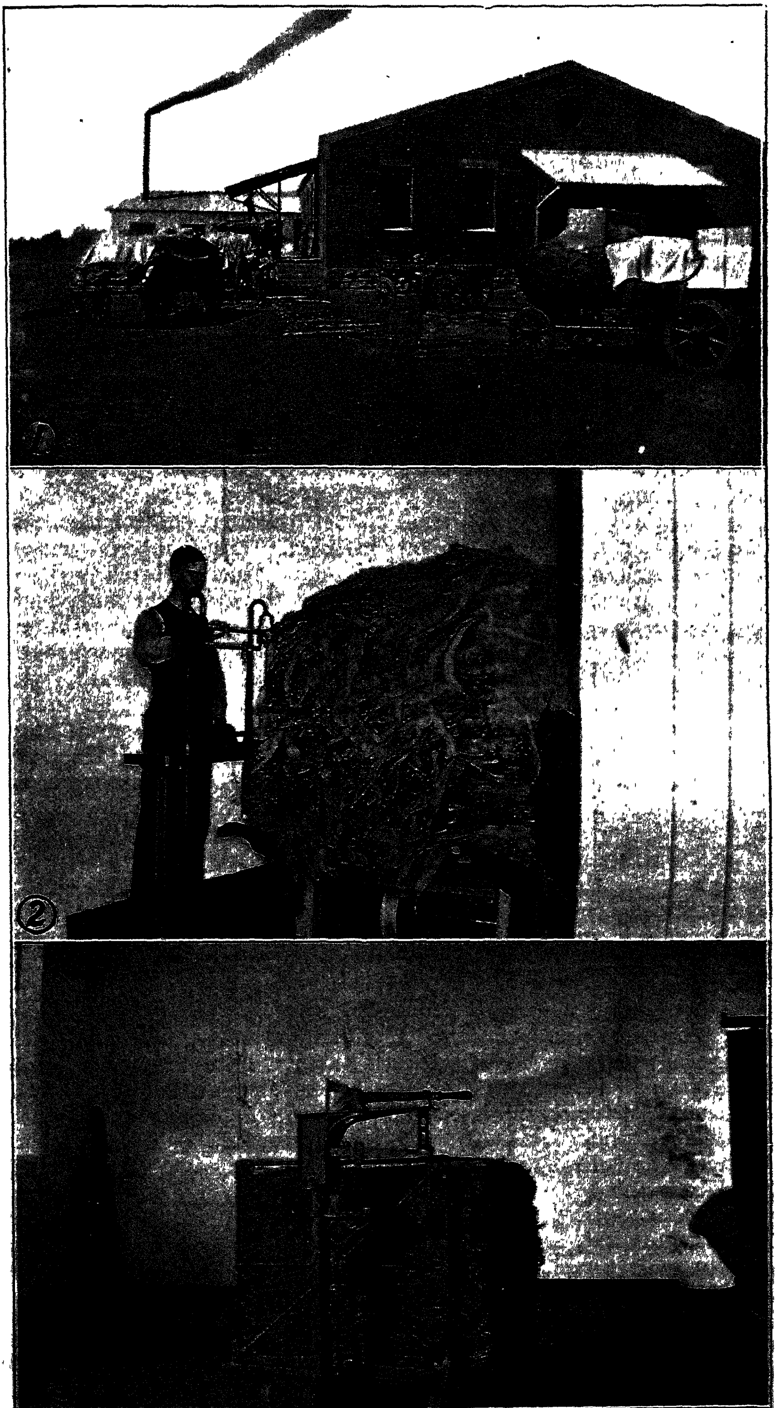


*Plate No. LXX.*

1. Tobacco Warehouse, Rustenburg. 2. Platform Scale. 3. Weighing Machine.

Division on this subject. We will, therefore, consider only the handling of the crop from the time it is taken to the warehouse until it is delivered to the manufacturer.

The first question to consider is that of finance.

If the business is conducted by a private company, it is controlled according to the ideas of the company's directors. When a warehouse is controlled by a co-operative society in this country certain laws passed by Parliament regarding the finances of such societies must be observed. Under certain conditions, co-operative societies can obtain loans from the Land Bank or perhaps from other banks, so that advance payments can be made to the farmers when their tobacco is delivered to the warehouse.

### BUILDINGS.

Next comes the question of suitable buildings. A warehouse may consist of two or three floors, but in South Africa one floor would be sufficient in most cases for the handling of leaf. The size of the buildings should be in proportion to the quantity of tobacco to be handled during a season of good business. The material may be wood and corrugated iron, but in hot dry climates brick walls are better. There should be windows sufficient to give light and ventilation. Large buildings should have sky-lights so as to distribute an even light to all parts of the building. The floor of the warehouse should be high enough for the air to circulate underneath, which will prevent the tobacco from absorbing moisture from the ground. In large warehouses a road for wagons to pass into the building is desirable. When wagons are off-loaded outside the building there should be a lean-to roof sufficient to protect the loads from rain while the wagon is being unloaded. [Plate LXX (1) shows such a shed.]

The building may be one large room, or if conditions require it the building should be divided into compartments suitable for the handling of tobacco in its different stages. Offices should be provided in or near the main building.

### EQUIPMENT.

The weighing machines should be situated on or near the off-loading platforms and should be mounted on solid foundations with the weighing platform level with the floor. [See Plate LXX (2).] Portable weighing machines on wheels are also needed so that they could be moved about and used for weighing bales and small lots of tobacco. [See plate LXX (3).] All weighing machines should have two beams: one for balancing tare, while the other gives the net weight of the tobacco.

In modern warehouses "dump" trucks and baskets [see Plate LXXI (4) and (5)], suitable for handling bales, are used for moving tobacco to and from different parts of the warehouse.

When tobacco is being handled in dry weather, steam is necessary for moistening it so that the leaves will not break in handling. The steaming plant consists of boilers, pumps, water-tanks, steam-boxes, steam and water hose, etc. Large tobacco warehouses are also equipped with what is known as a reordering machine [see Plate LXXI (6)] or with a drying-room. These are used when tobacco is prepared for the English market, and for tobacco which it is necessary to store for a long period.

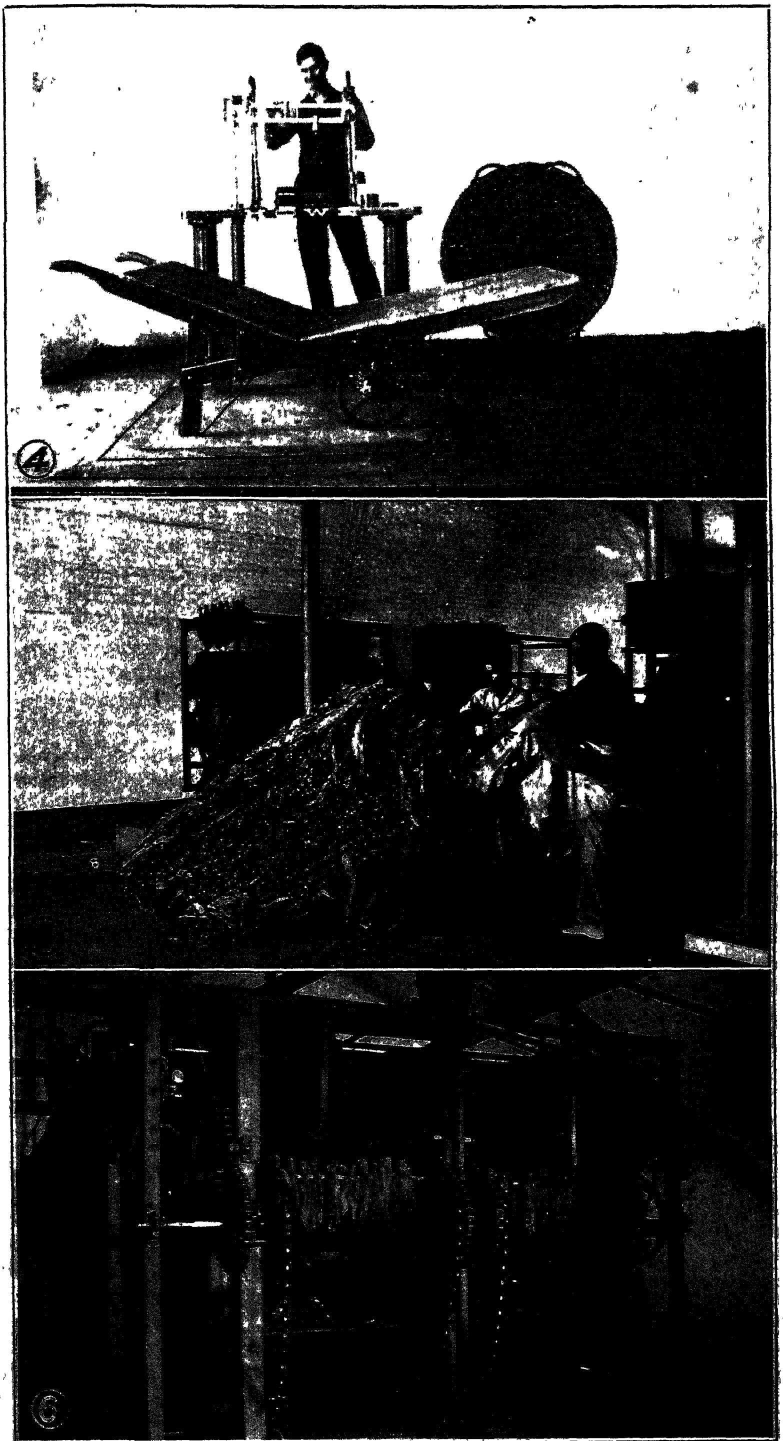


*Plate No. LXXI.*

4 and 5. Dump Truck and Warehouse Basket for Tobacco. 6. Reordering Machine.

All tobacco should be classified before being passed through the re-ordering machine, and for this purpose suitable sorting tables are required. Similar tables should be situated near the baling presses, on which the tobacco may be placed before being passed into the presses.

It is frequently necessary to hang the tobacco on laths to dry it. These laths should be about 4 feet in length and triangular in shape, the three sides each measuring about $1\frac{1}{4}$ inches. Laths of this shape will not turn over when filled with tobacco and hanging in the racks. Tobacco racks or trucks on wheels are needed for carrying the laths when the tobacco is to be conveyed about the warehouse.

When drying-rooms are used the trucks above described may be filled with laths of tobacco [see Plate LXXII (7)], rolled into these rooms and allowed to remain until the tobacco is dry. The temperature of the drying-room is usually kept at from 130° to 150° F., though sometimes it is raised to 200° by means of steam passing through several coils of pipes around the sides or near the floor of the rooms, and the hot air in these rooms should be kept in circulation by means of fans. When the tobacco is dry the trucks are rolled out of the drying-room into a cooling-room, and there remain until the leaves are in proper condition to receive moisture. The tobacco still on the trucks is then moved into an "ordering" room to receive steam until it becomes moist enough to handle. It is then in good condition for storing.

The reordering machine subjects the tobacco to treatment on the same principle as the drying-room. Laths filled with bundles of tobacco are hung on hooks of an endless chain [see Plate LXXI (6)], or the leaves may be put on a wire-netting belt. The tobacco then passes from one end of the machine to the other and is kept slowly but constantly moving from the time it is put into the machine until it reaches the other end.

From the re-ordering machine, or the "ordering" room, the tobacco is taken immediately to the baling-press.

The choice of baling-presses is usually governed by the requirements. Plate LXXII (8) shows a press which is sometimes used in warehouses and on farms. A good, though expensive press, is one which takes a case of suitable size, the necessary pressure being applied by means of a steel screw. A case is filled with tobacco and placed in the press; while the first case is being pressed a second case is filled in readiness for the press when the first bale is removed.

To complete the equipment of a warehouse there may be added sample-boxes, bucksails, thermometers, and thermometer tubes for use in testing the temperature of tobacco stacks, and a few minor articles of more or less importance.

### RECEIVING.

Next to the actual buyer and seller, there is no more responsible official connected with the warehouse business than the receiver of tobacco. If the crop has been bought previous to delivery the receiver must decide whether or not it is being delivered according to contract. It is necessary that he should be a close observer and possess good qualification or he will not be competent to detect any irregularity that might occur.

If the warehouse is managed on the co-operative plan, the position of receiver is even more important, for the tobacco is valued

by him for the co-operative society. The old dealers' maxim "tobacco well bought is half sold" proves equally true with a co-operative society as with any other dealer. This means that when the proper valuation is put on tobacco when it is bought, there will be but little trouble in selling it at a reasonable profit. On the other hand, if the valuation is too high it will be difficult to convince the buyer that the tobacco is worth as much as it was valued at.

When farmers deliver their tobacco to a warehouse they expect a settlement. If the crop has been bought by a manufacturer or dealer, full contract price should be paid at once. If delivered to a co-operative society, there should be a system by which the farmer could collect an advance payment on the delivery of his crop. The margin between the amount of this payment and the value of the tobacco should be sufficiently large to insure safety in the business. This necessitates care in keeping the books, which work should be done by competent men.

### BULKING.

There should be no pressure other than the weight of the tobacco placed on the bulk, and it should be left in a loose condition. There should be air-spaces between the stacks, and passages left through which to convey tobacco to and from the stacks. It is necessary to have thermometer tubes in the bulks so that a thermometer can be inserted at different places. These tubes need not be expensive; they may be made with three sides and just large enough to hold the thermometer. The sides, which may be of ordinary wood, should be perforated so that the heat from the tobacco will have access to the thermometer and the correct temperature recorded. The proper amount of moisture in tobacco, so that the temperature will rise high enough but not too rapidly can be judged only by experience.

### FERMENTING.

If tobacco is too dry when bulked it will not only break in handling, but will not ferment well. If, on the other hand, it is too wet, it will either become mouldy and have a bad odour, or will turn a dark colour if allowed to remain long in bulk. In either case it will deteriorate in value.

The temperature should rise slowly until it reaches 120° F., when the bulk should be broken down and a new one made. The outer portion of the old bulk should form the centre of the new, and the centre of the old bulk should be used for the outer part of the new. It has been found that if the temperature does not rise above 120° F. the leaf is usually improved in fermenting, but if the temperature reaches 140° the ordinary tobacco of the Transvaal turns a dark colour, which greatly decreases the value.

### CLASSIFYING.

If the tobacco has good burning qualities (without which it has but little value) the classifying should be done according to colours, length, breadth, and weight of the leaf. This work can only be done by experienced sorters capable of judging between leaves of different values. It has been said that a good tobacco man is born, not made, meaning that some have a natural aptitude for detecting the difference in quality, while others can never become experts at this work. To classify tobacco properly and rapidly requires good judgment and close

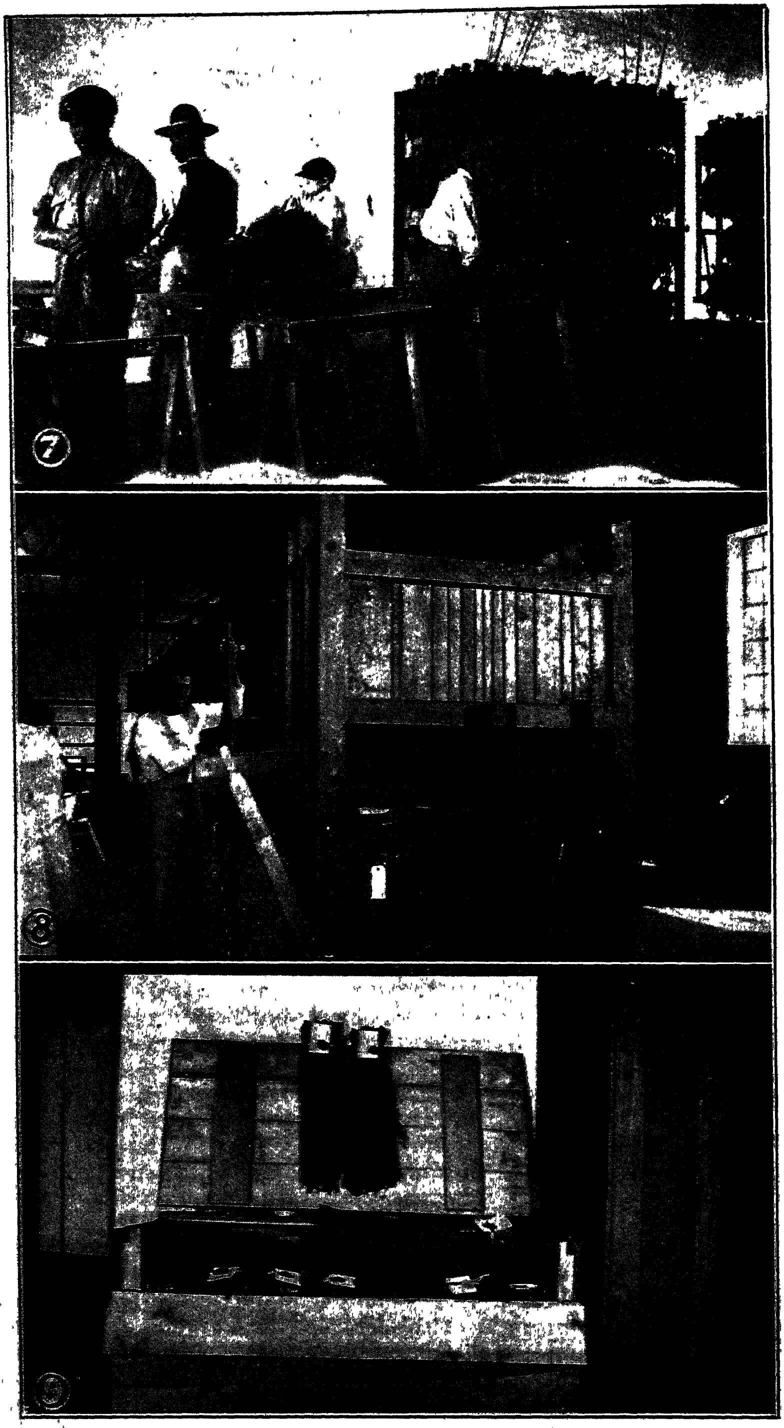


*Plate No. LXXII.*

7. Tobacco Racks or Trucks. 8. Baling Press. 9. Sealed Samples and Sample-box.

attention to the work. Graders should be provided with tables, situated in a good uniform light. In South Africa the south side of the house is the best for the windows, as the sun never shines directly on to the sorting tables from that direction, and the windows should be at the side or behind the graders.

### ORDERING AND BALING.

When tobacco contains too much moisture it should be treated to the drying process described in this article. If, on the other hand, the tobacco is too dry it should be moistened by placing it in a steaming-box made for the purpose, and steamed. The steam may be led into the box by means of perforated iron pipe, which should enter the box from one of the sides and close to the bottom, and the box should be as nearly steam-tight as possible. A drawer on rollers is provided to contain the tobacco and for rolling it into the steam-box. The steaming of tobacco should be very carefully done; if it is allowed to remain exposed to the steam for only a few seconds too long the leaf may be greatly injured. When the tobacco has absorbed sufficient moisture to make it pliable, it should be put immediately into the baling-press.

As the bales are made they should be wrapped with fine hessian, and if intended for export the bales should first be wrapped in oil-paper then with hessian, so that the moisture from the sea will not affect the tobacco.

### SAMPLES.

A sample may be drawn from each bale or one sample may represent several similar bales. Numbers on the samples must correspond to the numbers on the bales which the samples represent, and a complete record should be kept of each bale so that it can be traced to its destination. Samples are the basis of transactions between buyer and seller. Each sample should be carefully made so that it will fairly represent the bale or bales from which it is drawn. A card bearing the number and other marks of identification necessary should be affixed to the sample. As a protection to both buyer and seller the card may be affixed with a seal. [See Plate LXXII (9).]

### SELLING.

There is no more important part of the warehouse business than that of selling the tobacco. An important point is to inspire confidence in the buyer by convincing him that he will receive fair treatment, and that when he gives an order the goods will be delivered according to contract. The salesman can also advise farmers to grow such grades of leaf as the trade demands.

In considering a business, the first question which is usually asked is, "does it pay?"

In South Africa at present there is only one tobacco warehouse conducted on the co-operative plan. Tobacco delivered to this warehouse for the past two years was settled for at full market prices, with no expense to the farmer. By reference to the report of the auditor for the year 1912, we find that the gain in value of the tobacco handled in the co-operative warehouse was sufficient to pay all expenses of the business and still leave a balance of more than £6000 net profit to the co-operative society.

It would be well for all tobacco growers in South Africa to consider whether or not it pays to operate a co-operative warehouse.

# Feeding of Dairy Cattle in the Western Province, Cape.

## PRINCIPLES AND PRACTICE.

By P. Fowlie, N.D.A. (Lecturer in Agriculture and Stock at the Elsenburg School of Agriculture).

### Part I.

To understand how to feed cattle in order that they may give the greatest and most profitable returns for food eaten by them, it is first necessary to know something about the composition of foodstuffs and the needs of the animal to be fed, as well as to study the market or cost price of foods in order to decide which give best value for money.

Animals require a considerable amount of food to keep up the heat of their bodies, to supply the energy which they use up in moving about, and to repair the waste of their tissues which is always going on. This amount will be increased if the weather is very cold or if the animals are made to do a large amount of moving about or work, and lessened if the animal is (as far as possible) protected from cold winds and so managed that it has to take only a moderate amount of exercise.

In the case of dairy cows this is important, because it is only the food which is given in excess of what is required for these purposes which is available for the production of milk. Cows can only give their highest yields of milk if they are protected from extremes of heat and cold, treated kindly at all times, and given an abundant supply of suitable food without having to walk about too much in search of it. The part of her food which the cow uses for maintaining her body and keeping up its natural heat, and for producing the energy required for moving about, is generally spoken of as the maintenance ration, and this always forms a very large part of the total food consumed. Even in the case of a cow giving a high yield of milk the proportion of the food supplied to her, which she is able to turn into milk, is usually not more than a quarter, while in the case of a poorly fed cow, giving only a little milk, the proportion of food turned into milk is much less.

A cow can only produce the largest quantity of milk from her food when it is supplied to her in suitable proportions for milk production, and if she is given as much food as she can use. If the foods grown on the farm do not provide all the variety of food that the cow ought to have to form the best rations it will often pay well to buy, even at a high price, something to supply the substance that is needed, so as to enable the cow to make better use of the home-grown foods.

Much has been done by way of feeding trials and by chemical tests to find out what foods consist of and what the uses of the different

ingredients in ordinary foods are to the animal. Chemists divide the constituents of food into the following groups:—

(1) *Protein*, which may be called the flesh-forming group, because protein is necessary for the building up and maintenance of the muscles and other tissues of the body. It is also necessary for the production of milk, which, being intended for feeding the young calf so as to nourish it in the best way, contains a large percentage of flesh-forming substances.

(2) *Fats and Oils* are the substances in foods which are able to give the largest amount of heat and energy when used up in the body of the animal. When more are supplied than the animal requires at once they can be stored up as fat against times of scarcity. Milk contains a good deal of butter-fat, which, although not quite the same as the fats in food, is chiefly made from them.

(3) *Carbohydrates.*—Starch and sugar are the most important substances in this group. They can be used by the animal for all purposes that fats are used for, and can even be changed by the animal into fat. It, however, requires 2¼ lb. of carbohydrates to equal in value 1 lb. of fat.

(4) *Fibre.*—This is the stringy or woody matter which is found in the stems of plants, the husks of seeds, etc. It largely passes through animals undigested, although some may be digested and used in the same way as fats and carbohydrates. It is important in feeding cattle that they should have enough fibrous food to keep their large stomachs partly filled. If, however, too much fibrous food is given the digestive system has to deal with too large a bulk of food before sufficient nourishment is taken into the blood. It is even possible for an animal to starve to death while eating a large quantity of a very fibrous food such as straw or dried grass, if no other food is given.

(5) *Mineral Salts or Ash.*—From this class of substances the framework of the bones of animals is built up, and various salts are also needed for maintaining the proper composition of the blood and milk.

(6) *Water.*—All foods contain more or less water, but the food value of such water is exactly the same as that of pure drinking water. A regular and abundant supply of pure, fresh water is one of the very first essentials of successful stock management. Animals can live much longer without solid food than without water. If they are allowed to become very thirsty the processes of digestion and assimilation are hindered and the whole animal system, so to speak, loses time, even although the thirst is not severe enough to cause any more serious results. Cows should always be able to get all the water they want two, or preferably three, times a day.

The substances in foods are not all digested by animals. Some are always passed out in the dung, unused, and the amount thus lost is greater in the case of some foods than in others.

Taking foods as we find them on the ordinary farm, it is easy to divide them into three groups, viz.:—

### A.—GREEN OR SUCCULENT FOODS.

This includes pasture grass, lucerne, green barley, cattle water-melons, root crops, rape, cattle cabbage, and any other crop that is fed to cattle in the green state. It also includes ensilage, which can

well be described as bottled green stuff, because it is made by preserving green stuff in a manner very similar to the process by which fruit and vegetables are bottled for domestic use.

All kinds of green stuff are not suitable for making ensilage. The best for this purpose are mealies and the different grain crops, cut when the grain has formed, but before it has fully hardened and whilst the stalks and leaves are still mostly green. Legumes, such as vetches and different kinds of peas and beans, mixed with the grains make excellent ensilage.

At Elsenburg mealies are grown in summer for ensilage, and green barley or rye—mixed with vetches or peas—in winter.

The value of ensilage, if properly made, is very nearly the same as that of the green stuff from which it is produced.

In order to get the best returns from cows they should always have some green or succulent food. During some part of the year there will be pasture grass available, and whilst it remains succulent it is the best and cheapest food of this kind. Unfortunately in the Western Province good grazing can only be had for a short time in each year. The pastures become dried up very early in summer, and what is got from them then can only be classed as fodder.

At Elsenburg a succession of crops are grown to keep up a constant supply of succulent food somewhat as follows:—At the commencement of the year there is usually some ensilage still on hand, and cattle will also be able to get a little more or less succulent food around the fields where the grain crops have been removed, and also sometimes by grazing on rape if it is not all eaten off before this date. By the end of January there are green mealies ready for cutting, and from then right through to July there is mealie ensilage. Usually some other crops, such as mangels, cattle water-melons, and kale are ready for feeding from about April onwards. About July green barley begins to be available, and it lasts until the grazing is good. About the end of September some ensilage is made from green barley or rye mixed with vetches or peas, which carries us through until the next year.

One great advantage of ensilage is that it can be kept over and fed at times in the year when it is difficult or impossible to maintain a supply of succulent food in the fields.

Cows ought at all times to have not less than 20 lb. per day of succulent food, and are better with more; 30 to 40 lb. per day is a suitable quantity of green barley or ensilage, whilst of mangels and cattle watermelons—which are more watery—50 to 60 lb. per day is not too much. Green lucerne makes a very valuable addition to the food of dairy cows, as it is rich in flesh-forming constituents, while nearly all the other succulent foods which have been mentioned are poor in these substances. About 10 lb. of green lucerne with other green foods makes the proportion of the different food constituents of the ration more nearly correct, and lessens the amount of rich concentrated food that will be required.

### B.—FODDERS OR ROUGHAGES.

These include such substances as oat-straw and wheat-straw, and in areas where they are grown mealie stalks, manna hay, etc., as well as grazing during the drier part of the year. Lucerne hay may also be classed as fodder, though it is so much more valuable than the other things which have been mentioned that it almost requires

a class to itself. About 5 lb. of lucerne hay per day is a very useful addition to a ration for cows, and is about as much as it will usually be advisable to give. Other roughages are chiefly valuable for giving bulk to the ration, and cows should be allowed as much of them as they can eat.

### C.—CONCENTRATED FOODS.

This includes grains such as mealies, oats, wheat, and barley, and the by-products got from these in milling and brewing, such as wheat bran and brewers' grains.

There are two other substances which are as yet little known or used in the Western Province, i.e. peameal, beanmeal, and the various oil-seed cakes such as cotton seed, linseed, and ground-nut cakes.

These concentrated foods form the expensive part of the ration, and it is in their use that the greatest amount of knowledge and judgment is required. Without knowing the kind and nature of the succulent food and fodder which is being used, it is difficult to say how much concentrated food will be necessary, but as a sort of guide it may be laid down that, if a cow is getting a ration that is keeping her in health and fair condition when she is not milking she will require from 2½ to 3 lb. of concentrated food for every gallon, that is six bottles, of milk that she gives. This concentrated food should always be a mixture of at least two things, one of which can be a grain such as oats or maize, while the other should be some substance which is richer in flesh-forming matter such as brewers' grains, pea or bean meal, or one of the cakes.

Maize or oats mixed with bran are the commonest foods used by our dairymen. Brewers' grains are used where they can be got, while the other foods above mentioned are scarcely known.

The most common fault with rations in common use is that they are too poor in flesh-forming constituents, so that either the flow of milk is limited by the amount of these substances in the food or the animal makes milk at the expense of her own body and becomes poor in condition.

Maize is the most starchy food we have, and there is most danger when it is a large constituent of the food. Oats and bran are better, but could be improved by the addition of a small quantity of pea or bean meal or linseed or cotton cake. These are all substances that can be produced in South Africa. Peas grow well at Elsenburg, and deserve more attention in the Western Province than they have received in the past. Linseed also grows well, and, besides being good for strengthening and balancing cow rations, is excellent calf food. Last season a plot grown at Elsenburg yielded about 600 lb. per acre.

All grain foods should be crushed or ground into meal for cows, as otherwise they are not fully digested.

As cattle foods are liable to be short of common salt, and may also be short of bone-forming minerals—cows should always have access to a salt-lick. It is also advisable to give them some sterilized bone meal in their food at fairly frequent intervals, say once a week.

*(To be continued.)*

# Recent Soil Investigation in the Cape Province.

By Dr. C. F. Juritz, M.A., F.I.C., Chief Chemist, Cape Province.

(*Continued from page* 791.)

### Vanrhynsdorp.

In connection with the Olifants River Irrigation Scheme between five and six dozen samples, representing a very extended area, have been analysed, but only a few preliminary analyses came within the scope of the period at present being dealt with. No. 233 was a sandy alluvial soil, adjoining the river bank, fertile and easily worked, on the farm Houdmoed, where it was producing heavy crops. No. 234 was a fine heavy alluvial deposit, locally known as slyk, on the same farm. This soil is very heavy and difficult to work. No. 235 was a somewhat similar soil to the last, and was collected on the farm Vredendal. No. 236 was a fine silt from Kamkoes. Similar soil is met with in large quantities at Zwart Doorn River. As above stated, these analyses were made in the early stages of the investigation, and their purpose did not extend further than to ascertain whether an excess of brack in the soil would not interfere with its productiveness under irrigation. The percentage results of the analyses made with this object were as follows:—

| No. | Chlorine calculated as Sodium Chloride. | Carbon Dioxide calculated as Sodium Carbonate. | Total Soluble Salts. |
|---|---|---|---|
| 233 | ·018 | ·059 | ·148 |
| 234 | ·960 | ·104 | 1·472 |
| 235 | ·105 | ·071 | ·256 |
| 236 | ·093 | ·182 | ·340 |

Without adequate drainage these soils would assuredly become brack under irrigation, but there was no reason to assume that provision for systematic drainage of the soil would not be contemplated in connection with the projected irrigation scheme; at all events, the local topography, unlike that at Thebus, commented on in my "Study of Agricultural Soils of Cape Colony," pp. 180-184, lends itself to drainage, and so the danger from brack is the less to be feared.

Three soils, Nos. 237, 238, and 239, were subsequently collected on the farm Vredendal. Of these, No. 237 was taken at a spot about twenty-five minutes' driving approximately west of the homestead. The intervening tract of country seems to be almost continuously underlain by a sort of hardpan, which repeatedly crops out in large patches at the very surface. The soil at this point is what is known

as a red "Karroo" soil, and the vegetation over a large surrounding area consists almost exclusively of ganna. The sample No. 237 represents the surface soil to a depth of 12 inches, but the hard layer begins already at a depth of 9 inches from the surface, and was plainly calcareous and lighter in colour than the soil which showed at the surface. The hardness of the soil here increases with the depth, and below 17 inches deep it becomes exceedingly hard and practically impenetrable, dipping, however, to all appearances, sharply northwards. No. 238 was also a "Karroo" soil, taken, at a point nearer Vredendal homestead, from the surface to a depth of 10 inches only, below which depth the impervious hardpan prevented further penetration. Here, too, the vegetation consists chiefly of ganna bushes, but a shrub known locally as the "porselein bos" also abounds. No. 239 was a river alluvium from a locality where vegetation is scanty; a few ganna bushes (*Salsola aphylla*), fewer still "Vaal" bushes (*Atriplex*) are very sparsely scattered about, and one gains the impression as though the soil were too saline even for these soda-loving plants. Dried and stunted mesembryaceae are present in larger numbers. An alluvial soil, No. 240, was collected from a brack patch on the farm Houdmoed at a depth of 2 feet below the surface. The results of the agricultural chemical analyses of the four soils last mentioned were:—

| No. | Percentage of Field Sample. | Percentage of Soil sifted through 1 mm. Sieve. | | | | Percentage of Soil sifted through ½ mm. Sieve. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fine Earth below ½ mm. | Water. | Organic Matter. | Chlorine. | Nitrogen. | Lime. | Magnesia. | Potash. | Phosphoric Oxide. |
| 237 | 85·9 | 1·68 | 3·87 | ·083 | — | ·323 | — | ·232 | ·124 |
| 238 | 67·6 | 2·62 | 2·60 | ·039 | — | ·315 | — | ·252 | ·128 |
| 239 | 99·9 | 1·26 | 3·30 | ·028 | — | ·271 | — | ·176 | ·168 |
| 240 | — | 1·06 | 2·92 | ·0071 | ·098 | ·082 | — | ·101 | ·026 |

Although taken at points over a mile and a half apart, there is a remarkable similarity in composition of the fine earth in samples Nos. 237 and 238. All these soils are satisfactorily supplied with inorganic plant food, and they should prove abundantly fertile provided there be no extraneous obstacle to their successful cultivation. The soil represented by No. 240 is somewhat of an exception to this; it contains a fair amount of potash but is poor in respect of lime and phosphates, and, to judge from the comparatively small proportion of chlorine, the alkali salts comprise mainly sulphates, with perhaps some carbonate.

By way of emphasizing the difference in composition between an exhausted or poor soil and one well supplied with plant food, the sample No. 237 in the above table may be compared with No. 6 of the orange orchard in the Albany Division. The reserve of available lime in No. 237 is about twenty times that in No. 6; of potash No. 237 has nearly seven times as much as No. 6, and No. 6 contains

not more than one-fourth the quantity of available phosphoric oxide that there is contained in No. 237. This comparison will perhaps be more striking if put in the following form:—Assuming as a basis of calculation that each acre (i.e. half morgen) of soil to a depth of one foot weighs 2000 tons (one ton = 2000 lb.) then the weight in pounds of the plant food reserves per acre-foot in each of the two soils that we are comparing would be as follows:—

| No. | Lime. | Potash. | Phosphoric Oxide. |
|---|---|---|---|
| 6 | 640 | 1,400 | 1,280 |
| 237 | 12,920 | 9,280 | 4,960 |

## VICTORIA EAST.

Of the two Victoria East samples, one, No. 241, was taken from the open veld, and had never been manured; the other, No. 242, was collected from an erf under water, and had probably been manured with kraal manure. These two soils yielded the following results upon analysis:—

| No. | Percentage of Field Sample. | Percentage of Soil sifted through 1 mm. Sieve. | | | | Percentage of Soil sifted through ½ mm. Sieve. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fine Earth below ½ mm. | Water. | Organic Matter. | Chlorine. | Nitrogen. | Lime. | Magnesia. | Potash. | Phosphoric Oxide. |
| 241 | 91·3 | — | — | ·012 | — | ·042 | — | — | ·030 |
| 242 | 88·0 | — | — | ·011 | — | ·094 | — | — | ·033 |

In both these soils lime and phosphoric oxide are deficient, and in this respect they resemble the soil from the Hogsback, Tyumie District, referred to on page 141 of my "Agricultural Soils of Cape Colony."

## VRYBURG

Nos. 243 and 244 represent respectively grey and red sandy soils—the red soil being by far the more abundant of the two—from the farm Palmyra, in connection with which the dry land culture of lucerne had been proposed. For this purpose mechanical analyses were made, the results of which were as follows:—

| No. | Pebbles, >3 mm. | Gravel. | | Sand. | | | | Silt. ·05-·005 mm. | Clay, < ·005 mm. |
|---|---|---|---|---|---|---|---|---|---|
| | | Coarse, 3-2 mm. | Fine, 2-1 mm. | Coarse. 1-·5 mm | Medium, ·5-·25 mm. | Fine, ·25-·1 mm. | Very Fine, ·1-·05 mm. | | |
| 243 | Nil | ·18 | 1·45 | 5·33 | 27·62 | 49·30 | 9·18 | 3·37 | 3·17 |
| 244 | Nil | Nil | ·68 | 4·93 | 34·56 | 49·60 | 4·80 | 3·14 | 2·27 |

These soils may be described as medium sands. They consist principally of medium and fine sand, and in connection with their adaptability for lucerne growing they may be compared with No. 43 of the Britstown soils (on which lucerne thrived) and No. 51 (on which the lucerne was a failure). For this purpose I have graded them on broader lines than the above, as follows:—

| No. | Pebbles, 3 mm. | Gravel, 3-1 mm. | Sand, 1-·05 mm. | Silt, ·05-·005 mm. | Clay, ·005 mm. |
|---|---|---|---|---|---|
| 43 | 1·18 | 1·58 | 72·73 | 13·18 | 11·32 |
| 51 | ·02 | ·04 | 23·86 | 35·11 | 40·88 |
| 243 | Nil | 1·63 | 91·43 | 3·37 | 3·17 |
| 244 | Nil | ·68 | 93·89 | 3·14 | 2·27 |

We may also, as in the case of the Britstown soils, compare the proportions of (*a*) medium and fine sand with (*b*) silt and clay; this is done in the following table:—

| No. | (*a*) Medium and Fine Sand, ·5-·1 mm. | (*b*) Silt and Clay, < ·05 mm. | Proportion of (*b*) if (*a*) = 1. |
|---|---|---|---|
| 43 | 66·80 | 24·50 | ·37 |
| 51 | 18·43 | 78·99 | 4·12 |
| 243 | 76·92 | 6·54 | ·09 |
| 244 | 84·16 | 6·41 | ·08 |

The Britstown soil where the lucerne crop succeeded contained much more fine sand and much less silt and clay than the soil on which the crop failed. These two Vryburg soils contain even more fine sand and still less silt and clay than the good Britstown soil.

## WORCESTER.

The four soils, Nos. 245 to 248, were collected on the farm Leipzig, in the Nuy Valley. It was stated that "the most excellent wines are produced on this estate, and what is more noticeable is that though there appears to be an excess of lime none of the vines

appear to have suffered from chlorosis when planted with stocks which are only capable of growing in soils poor in lime." No. 245 represents a surface soil and No. 246 a sub-soil from a patch used for growing vines from which pontac wine is made. This soil had been treated with kraal manure a year previously. Nos. 247 and 248 were surface soils; the former had been used for growing vines from which had been produced the wine that had been awarded the Jagger Cup at the Western Province Agricultural Show. No. 248 was a very similar soil taken at a point about 200 yards distant from the spot where No. 247 was collected. Vines, however, do not flourish there, nor, in fact, do any fruit trees.

Partial mechanical analyses of these soils resulted as follows:—

| No. | Pebbles, > 3 mm. | Gravel and Coarse Sand, 3—·5 mm. | Fine Earth, < ·5 mm. | Nature of Pebbles and Gravel. |
|---|---|---|---|---|
| 245 | ·1 | 4·7 | 95·2 | Mostly quartz grains, with quartzite, mica, schist, and crystalline vein quartz. |
| 246 | ·1 | 5·5 | 94·4 | |
| 247 | ·8 | 9·1 | 90·1 | Almost entirely quartz and quartzite. |
| 248 | ·2 | 9·3 | 90·5 | |

All these soils appeared loose and loamy, capable of permitting free passage of water and air, and, as far as their general physical properties are concerned, excellent.

The analyses as to the reserves of plant food in these soils gave the following results:—

| No. | Percentage of Field Sample. | Percentage of Soil sifted through 1 mm. Sieve. | | | | Percentage of Soil sifted through ½ mm. Sieve. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Fine Earth below ½ mm. | Water. | Organic Matter. | Chlorine. | Nitrogen. | Lime. | Magnesia. | Potash. | Phosphoric Oxide. |
| 245 | 95·2 | 1·26 | 2·29 | ·046 | ·080 | ·077 | ·186 | ·026 | ·061 |
| 246 | 94·4 | 1·11 | 1·88 | ·024 | ·056 | ·052 | ·140 | ·036 | ·054 |
| 247 | 90·1 | ·51 | 1·29 | ·028 | ·049 | ·040 | ·083 | ·034 | ·050 |
| 248 | 90·5 | ·92 | 2·58 | ·027 | ·105 | ·074 | ·105 | ·037 | ·068 |

The amounts of nitrogen, lime, and potash in these four soils are very small indeed, nor is the percentage of phosphoric oxide quite satisfactory. There is nothing remarkable in the fact that vines which, as a rule, cannot endure lime soils have in no way suffered here, for, so far from these soils containing an "excess of lime," analysis shows in them a very small amount of acid-soluble lime. At the same time it is possible that only the surface layers consist of material poor in lime, and that the excess of lime exists only in the lower levels; but, largely derived as these soils apparently are from

quartzitic rocks, it is to be expected that they would be inherently poor, not only in lime but also in other plant food constituents. As Nos. 247 and 248 were very similar in appearance and plant food content, and the latter was declared to have been found unsuited for vines and fruit trees, the proportions of water-soluble salts were determined in each of these two soils. The percentages of carbon dioxide were only .002 and .005 respectively. In both soils the proportions of alkali were exceedingly low, and the difference in fertility could certainly not be due to either deficiency of plant food or presence of brack salts. The total water-soluble salts amounted to not more than .070 per cent. in No. 247 and .088 per cent. in No. 248.

(*To be continued.*)

# Some Points on Karakool Sheep Farming.

BY M. KARPOV.

(*Translated from the Russian by S. Meyerson, Pretoria.*)

(*Continued from page* 766.)

THE statement regarding the motliness of Karakool herds, over which not the least conscious care on the part of the herdsman is exercised by the partially civilized natives, is sufficient to allow conclusions to be drawn as to the small requirements of these sheep. As a matter of fact, Karakool sheep, even in the early days of their existence, have no warm shelter, nor do they receive fodder during the winter. They run, indeed, all the year round under the open sky on whatever grazing they can find. The small requirements of these sheep become evident when one considers the heat of the summer in the steppes of the Bokhara Khandate, lying as it does more to the south than Messina; the severity of the short winters, when the temperature falls sometimes as low as —30° C.; and, besides all that, the comparatively frequent sandstorms in those regions. In addition to a meagre fare, they have to endure an extraordinary wide range of fluctuation of temperature. The grazing conditions of these sheep also are not too good. The most favourable season for their maintenance is the spring. During this period the greater portion of the area of the Khanate (217,674 square versts) is covered with green vegetation, but even then, as I could observe, the pastures in Bokhara did not form one continuous plain of grass. It can only be said that, in comparison with other seasons, the pastures in Bokhara are good in the spring. At the expiration of this short

period, lasting from the middle of March until May, the grass begins to dry up fairly quickly, and the ground, shortly before covered with green patches of grass, soon turns yellow, with all vegetation dried up and stunted, except for the tall, deep-green, succulent bushes of a herb called by the natives "Ozorespan," which, however, is not edible. There is no need to say much about the grazing value of a steppe which is almost the whole year round covered with unmown dry grass, and yields grasses known to the native as "Kerke," "Salau," "Shura," "Tyooataban." Flourishing in some degree at the beginning of the summer on xenophites (vegetable parasites), which remain green after the spring grass has all dried up, they get through the summer somehow, but the hardest time for them is the winter (fortunately short), when they are obliged to search with much trouble underneath the snow for whatever grass there may still be left. There are other kinds of dry grass which, in this season, by the action of the low temperature and principally of moisture, become more eatable for them, namely, the so-called "Jantak," "Camel grass," etc.

Besides being usually hard, this winter period becomes in bad years even ruinous for sheep farmers, in as much as great numbers of sheep are then lost. Frosts, colds, lack of food, as happened in the winter 1910-11, do away with extraordinary numbers of sheep, and altogether ruin the inhabitants of Bokhara, poverty stricken as they already are. Sometimes, driven by a blinding snowstorm so awful in the steppes of Asia, the sheep, panic-stricken, stampede into all directions and perish helplessly. It happens also that the earth unexpectedly becomes covered with a layer of ice, and thus suddenly deprives the sheep of the chance of seeking food for themselves, and then there is another awful blow to sheep farming—death from starvation—"dzhut," as they call it.

Only lately have the natives begun to care a little about supplying food for the winter and started to lay in some stock of hay in the summer. Here and there (as, for instance, in the neighbourhood of Karakool) they supplement the sheep's food in hard times with linseed and with camel grass. Covering rams, however, forming as they do a small group in the herd, usually receive supplementary fodder. Thus owners remove the rams from the herds in August, keep them apart, drive them sometimes even up to the homestead, and feed them with either lucerne, barley, linseed, or any other fodder at hand, to keep them in good condition for the covering period.

By the way, it may be mentioned here that not all writers name the fodders used in the Khanate correctly. Thus, Sinitsin, for instance, writes that rams are fed with blue lucerne. clover-hay, and also with corn. As for clover-hay, it must be said that it can never be used as food for rams, because clover is not grown at all, either in the Khanate or in the neighbouring countries. True, lucerne is sometimes by mistake called clover, but Sinitsin mentions them both. The same reference to the feeding of rams with both lucerne and clover is also mentioned by Professor P. N. Kooleshov.

The keeping of sheep in sheds is not practised in Bokhara, since, with the customary migrations of the herds, it would be impossible to have everywhere such structures. There, moreover, seems to be a prejudice against the stabling of sheep. Mamooj-Aksakal [probably a more important herdsman—TRANSLATOR] at least told me that

stabling was not common, and that his own experiment in keeping twenty pedigree rams in a shed over the winter had not been successful. As to spring and summer grazing, it must be mentioned that herds are taken over several pastures in turns; as the grass becomes too scorched in some districts they are taken to others which are in a better state, such as places under the mountains, the far perennial steppes, the neighbourhood of dams, etc. The Karakool oasis has for such alternate grazings the steppes of Mokhan, Oorgentsh, or Kamashi, Maimanak, and others; for Karki there are as alternate pastures the steppes of Khodzha, Dzhom-Bos and others. There are, besides, districts to which herds are driven in exceptionally bad years, when, for instance, from the last-named steppes of Khodzha and Dzhom-Bos sheep are driven over a distance of 6 to 8 tashs (1 tash = 8 versts; 1 verst = 5/6ths English mile) further north-west.

Besides the absorption or great deterioration of the vegetation, there is another cause which forces the herds to migrate—the drying up of the water—this principal source of life and prosperity for this as for any other region. But hardly anywhere on the globe is the water question of such importance as in the dry region of Bokhara, with its rainfall of scarcely 100 mm., and the little moisture in its soil. It must, however, be pointed out that the same water, the lack of which has turned a great area of the Khanate into a dead steppe, becomes fatal for the Karakool sheep when it happens to be over-abundant. Having become accustomed through a series of generations to a dry climate they react strongly, as has variously been observed, with an over-abundance of water. For this reason the attempts to introduce Karakools in the moist localities of Caucasus have not been successful. Naturally a change of food in itself also affects the condition of these sheep. The habitual feeding for generations on the poor pastures of Asia explains the fact that Karakools transported to other places always prefer stubble to juicy grass of the meadow lying side by side with it. But it is worthy of notice that they adapt themselves more quickly to a change of food than to a change in conditions of water supply; with an abundance of moisture they begin to ail and soon afterwards die.

As regards the health and veterinary condition of these herds, one can hardly entertain favourable expectations in view of what has been said before about the extensiveness of the farming. The Emirs not only provided no veterinary assistance for cattle, but not even medical aid for men, leaving in this respect the whole population at the mercy of a lot of quacks. There is now, by the way, one veterinary surgeon appointed on the railway which crosses Bokhara, but he, naturally, can only serve the interests of the railway. Bokharian sheep farming, therefore, suffers from losses through epizootic and enzootic diseases. Diseases like pox and scab are, unfortunately, too frequent companions of the herds, are a great obstacle at purchases of single sheep from a great number of herds. Since the accession of the present Emir, however, veterinary conditions have been improved a little by his maintaining since 1912 two veterinary stations and one agricultural expert.

I do not consider it necessary to deal more particularly with the conditions of covering and yeaning of Karakool sheep, as they have been so well dealt with by I. V. Sinitsin. I may, therefore, simply state that it is impossible to consider as rational the usually wild or

free pairing practised at present. If it should be too much to expect in Bokhara a transition to the scientific improvement of the covering, at least with the present system of renting these sheep through their natural increase, Harem pairing should be introduced in the near future.

Agreeing in general with all that has been said by Sinitsin about yeaning, I cannot confirm the fact mentioned by him that the young rams kept for pedigree purpose are sewn up into cloths, as, travelling there during the actual yeaning season, I had no opportunity of seeing this done. Personally I should not be able to explain the sense of trying to prevent the hair of the young rams from turning red by the help of a cover, since this is unavoidable as they advance in age.

Limiting myself to the above as regards the sheep themselves, I shall now deal more particularly with the purchase and export of both the sheep and the lamb skins. Generally one finds that the natives in the steppes are little inclined to sell pedigree stock. The great rise which has taken place lately in the price of lambskins is probably the cause of this. In negotiating with an owner, first of all the question has to be tackled whether he would like to sell something. The answer being in the affirmative, one has to bargain for a greater number, since he may at first only consent to sell one or two rams. Then one proceeds to choose the animals, catch them, inspect them, and then bargain about the price. Of course, it is quite possible to ride far and wide in these steppes without any other result than getting tired and worn out. In that case one is either told that there is nothing to sell except perhaps a few rejected rams, or one is asked impossible prices. I shall not describe the forced sales, which were until lately practised under the pressure of the Emir's officials, since they are a thing of the past. Purchases in the steppes are also beset with the further difficulty that one has to leave any sheep bought in the charge of shepherds, who are usually not above meddling with them on their own.

As a general fact it may be remarked that well-to-do proprietors, i.e. just those who possess the best and purest herds, as a rule do not sell any sheep. To start with, they have no need to sell, as they get their return by the sale of greater numbers of lambskins; and it is also in consequence of a strange code of ethics adopted by them, that they do not like to part with sheep. A wealthy man, a few of them told me, does not sell because, if he did, people would say that he is in need. Should the would-be buyer still insist, then this may be for him the occasion to hear again the pronouncement fairly frequently heard from wealthy owners, "If you want it for nothing, you may take it, but I won't sell"; or he may hear yet more often, "If so-and-so (mentioning somebody living a good few *tashes* away) will sell, then I will do so too."*

* Intending importers of Karakools in this country should not be deterred by the experience of the writer. Apparently travelling in some official capacity, he was considered a Tshinovnik by natives; and, as an honest official, he became an innocent victim of the more common practices of the Tshinovnik in his dealings with so-called Inorodtsi (Russian subjects of non-Russian birth). Russian lawlessness places these at the the mercy of the Tshinovnik, and the latter would now and again offer immunity from his own pesterings by the suggestion of a bribe pure and simple or under the veil of some purchase. Conscious of his helplessness and that the refusal of the so-called sale would probably involve him in greater losses, the Inorodets, if he is wise, will first show some

Possessors of medium and small herds agree yet to sell, but not the best specimens which a would-be buyer would pick out, and offer instead comparatively the worst, and of these only a small number of head. But in such herds the selection of a more or less considerable number of good specimens is in any case very limited. When a sale is at last effected, one has not always the occasion to consider the Sarts and Turkomans (races in the Bokharian steppes) as gentlemen. The buyer cannot always be sure that the seller, having received his price and paid the so-called "Zyaket" (a tax in favour of the Emir) to the Bokharian official present at the sale, would not change his mind, cancel the sale, and return the money paid.

Such business methods appear particularly strange on the part of the Sarts, who are by nature a commercial people and have turned their towns into one continuous mass of bazaars. But it may be that in more populous centres it is the avenging sjambok of the Rhaja who drives about the bazaar with his suite and metes out punishment in public which serves to maintain better business manners.

To the difficulties of purchases in the steppes must also be added that of collecting the sheep from various herds—sometimes far apart from each other—and of getting them to a railway station.

Apart from the steppes sheep are also sold on the bazaars, but amongst these it is only that of the town of Karakool which comes in for serious consideration. On the bazaars of other towns and stations one can only expect to find by chance a very inconsiderable number of sheep often rejected as unfit. On the contrary the bazaar in Karakool —the traditional purchasing place for buyers from Russia—offers greater quantities, and on Mondays and Thursdays, which are the market days there, one can find quite satisfactory and sometimes even very good pedigree stock. However, if one has to secured a considerable number he would be better advised to go into the steppe, since the numbers offered on the market in Karakool would not be sufficient.

For a long time, owing to purchases in the Karakool Oasis, the natives have been in the habit of bringing up a small number of young rams which, not being required as pedigree stock, would otherwise have been killed off in the first days of their lives for their skins.* The constantly rising price for pedigree stock acts as a further incentive. For this reason it is not at all easy to obtain pedigree stock in places where there is no demand for them. Thus I had the greatest difficulty in buying some in the steppes of Karki, where, so the natives said, I had happened to come as the first buyer.

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reluctance to part with the coveted object (so as to enhance its value in the eyes of the Tshinovnik and keep him off for a longer period), and then make the pronouncement:—

| | | | | |
|---|---|---|---|---|
| *Khotite* | *darom* | *rozmite* | *prodavat* | *ne prodam.* |
| You want | for nothing | take | to sell | I shall not sell— |
| Do you want | | | | |
| If you want | | | | |

which is ambiguous, and may mean as translated and understood by the writer, or in plain English: "(I see) you want (to have) it for nothing—take it (then). As for selling (you know) that I won't sell (anything to you)." Good English coin will buy anything everywhere.—TRANSLATOR.

* Young rams, with the exception of a small number kept for breeding are, as is well known, killed in Bokhara for their skins, and for this reason there are no wethers at all in those herds, which thus consist exclusively of ewes, with a small number of rams. The lambskins used for collars, furs, caps, etc., are in this way obtained only from the increase of males.

By the way, it may be mentioned that, though in this almost unknown region of the Karki steppes, situated on the Amoo-Darya, herds are found comprising comparatively good pedigree stock (which, besides, can be obtained at a lower price than in the rest of the Khanate), I would, nevertheless, not advise anybody to go for purchases there under the present circumstances, principally on account of the great expense entailed by the transport of the sheep to the station of Tshardzhui.*

Concerning the present prices of Karakool sheep in the Khanate of Bokhara, one cannot help considering them relatively high. The rise in general has taken place fairly regularly and quickly, and the same tendency is still prevailing. Only a short time ago they were bought for roubles (1 rouble = approximately 2s.); now they are valued by tens of roubles. Thus in 1890 the Rural Council of Eupatoria still obtained ewes at from 5.40 to 7 roubles (10s. 9d. to 14s.), and rams at from 9 to 12 roubles (18s. to £1. 4s.) a head; in 1896 ewes at 4 to 7.75 roubles and rams at 6 to 16 roubles; the price for the Experimental Farm at Askhabad amounted in 1896, with transport and all, to an average of 13.09† roubles; the Agricultural Society of Poltava paid then for ewes 9.09 and for rams 11.20 roubles each; but the price which the Agricultural Department had to pay in 1910 already came up in some places for average lots of 75 head at 18.66 roubles each for ewes and 36.87 roubles each for rams. Approximately the same prices were paid by the Poltava Agricultural Society in 1909 and 1910, with sometimes as much as 60 roubles each for very good rams. The Askhabad Experimental Farm, buying in 1910 a few rams, even with the assistance of the Begg and the military chief, had also to pay 60 roubles per head.‡

* But being not very far from the Khyber Pass and the Indus, by which it may be possible to get sheep down to the Indian Ocean on barges, it is just this very region and the region of Afghanistan adjoining it which would recommend itself as recruiting ground for us.—TRANSLATOR.

† Figures after decimal point denote "kopeks."

‡ After the bad winter of 1910-11 when many sheep died, the price for rams, as the local veterinary surgeon reports, rose still higher.

*(To be continued.)*

# Co-operative Experiments; Grootfontein School of Agriculture, Middelburg, C.P.

By A. K. Hards, Agricultural Assistant.

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## Grass Demonstration Experiments, 1910-13.

With a view to demonstrating the feeding qualities of artificial pastures and their carrying capacity when grazed to stock, three large experiments were laid down in Komgha and Stutterheim.

### *J. B. Sparks, Haddon, Komgha.*

The soil was a well worked clayey loam on a slope with a south-eastern aspect. Seed was sown broadcast and harrowed in in August, 1910.

*Perennial Rye Grass.*—Five acres were laid down to this variety at the rate of 28 lb. per acre, with the addition of 2 lb. of clover to the acre. It came up well, and, for the first two years, looked very well. The sheep ate it greedily and fattened well on it. It took rust the second year and died off completely.

*Italian Rye Grass.*—This grass was put down on a 3-acre plot adjoining the above. It was sown at 28 lb. per acre with 2 lb. of clover mixed with it. It also took rust the second year and died out.

*Tall Oat Grass.*—It was laid down on a 3-acre paddock at 28 lb. per acre with the addition of 2 lb. giant cow grass per acre. It grew magnificently the first two years and stood about 18 in. high without seed. Sheep did not take to it readily at first, but ate it with avidity later. When finally inspected in July, 1913, it was still standing thickly, but cropped very short and with a lot of weeds growing in it.

*Tall Fescue Grass.*—Was sown on 2 acres at the rate of 28 lb. per acre. Did not germinate.

*Paspalum Dilatatum.*—Six acres sown to this grass at the rate of 20 lb. per acre. The soil was a sandy loam. Giant cow grass was mixed with it at the rate of 3 lb. per acre. The grass did not show up until the spring of 1911 when the ground was covered with a scrub, by name M'Canga; the clover had then disappeared. When inspected in July, 1913, it was standing thickly and spreading. No record of grazing was kept, but it was quite a success.

### *H. A. Galpin, Campagna, Dohne.*

Eighteen acres were laid down on this farm, the soil being a light sandy loam. Five acres were sown to paspalum and 13 acres to mixed grasses. The locality is considered a very dry one. The mixture of grasses contained the following: 110 lb. tall fescue grass, 110 lb. Devon evergreen rye grass, 75 lb. cocksfoot grass, 20 lb. broad red clover, 5 lb. sheep's burnet, making a mixture which was sown at about 25 lb. per acre. The grasses were well mixed prior to sowing, which took place in March, 1911. The seed was sown broadcast. The grass grew luxuriantly and by the following spring stood about 30 inches high, when it was mown and gave a good stack of excellent hay. After this it grew rapidly again, and by 1912 was able to admit

of 400 sheep being grazed in the paddock for three months throughout the drought. Inspection on 18th August, 1913, showed the grass very closely cropped by the sheep. The varieties then in prominence were cocksfoot, tall fescue, and sheep's burnet, the rye grass and clover having completely disappeared. The rye grass appeared in the mixture in too great a percentage, being, roughly, 33 per cent., whereas 20 per cent. would have been ample. On the other hand the quantity of cocksfoot was too small, and should have been represented to the extent of about 30 per cent. of the whole.

*Paspalum dilatatum.*—Knowing the hardiness of this grass, it was not thought advisable to put it with the other grasses, and 5 acres were sown at the rate of 20 lb. per acre with 15 lb. of broad red clover in March of 1911, along with the other plot. It only showed up the following spring, but improved rapidly. The sheep also grazed on this plot in 1912. In August, 1913, when inspected, the crop had a thorough hold of the ground, and young plants were springing up all round. Very suited to these parts.

*C. Field, Wanstead, Cathcart.*

Twenty-five acres of ground were sown to grasses on this farm. The soil was very poor. Red weed, or "steenbok zuuring," grew in great abundance. After ground had been well prepared in April of 1911, the seed was sown broadcast and harrowed in. The following mixture was put down: 100 lb. cocksfoot grass, 60 lb. tall oat grass, 150 lb. Devon evergreen rye grass, 90 lb. perennial rye grass, 90 lb. tall fescue grass, 20 lb. Spanish sulla; total, 570 lb. of seed, sown at about 25 lb. per acre. These grasses also germinated well and were sufficiently matured the following spring to be mowed. Thereafter sheep were constantly grazing in small lots on this plot. Here, again, the rye grasses were present in too great a percentage, being at the rate of about 53 per cent. instead of 20 per cent., and when the plots were finally inspected they were conspicuous by their absence and the ground that had been occupied by them was in consequence bare, the only grasses standing being cocksfoot, tall fescue, and tall oat. The sulla had also disappeared. A better mixture here would have been 20 per cent. cocksfoot, i.e. 150 lb., tall fescue, 20 per cent. or 150 lb., tall oat 20 per cent. or 150 lb., and the "rye" grasses 20 lb. each variety. By this means, when the "rye" grasses died out, their places would have been taken by the expansion of the permanent grasses.

## MAIZE VARIETY TESTS, 1912-13.

### *Eureka.*

*A. E. Goodwin, Saxonholm, Cathcart.*—Soil a sandy loam well worked. Seed was drilled in rows 3 feet apart at 16 lb. per acre. Sown on 24th December, 1912. During its growth it was irrigated twice. On 24th April it was reaped and gave a return of 700 lb. grain from the 5 lb. of seed sown, or a return of 2240 lb. of grain per acre.

This was the only experiment that came to maturity, the others, i.e. T. F. Miller, Winston, Cathcart; J. Landry, jun., Crawley, Cathcart; E. Sparks, Happy Valley, Cathcart; plots were all destroyed by drought.

### MAIZE MANURIAL TESTS, 1912-13.

Three experiments were laid down, namely, at Komgha (J. N. C. Hardwich, Westbury; and J. W. Sparks, Hopewell) and Cathcart (T. F. Miller, Winston). The two at Komgha were sown to Eureka maize, but blight took both crops. The one at Cathcart sown to Bread maize was destroyed by drought.

### GRASSES VARIETY DEMONSTRATION EXPERIMENTS, 1911-13.

*Charles Thompson, "The Planes," Komgha.*

Soil selected was a sandy one, rather poor, and a dry locality. Prior to sowing, the ground was ploughed, pulverized, and twice harrowed. The seed was broadcast and harrowed in on 15th May, 1911. The plots were examined on 5th March, 1913, with the following results:—

*Devon Evergreen Rye Grass.*—Was sown at the rate of 28 lb. per acre. It came up well, but when examined later, there was no grass showing, having died during the drought.

*Perennial Rye Grass.*—Was sown at the rate of 28 lb. per acre. It came up well, but was killed by drought.

*Italian Rye Grass.*—Sown at the rate of 28 lb. per acre. It germinated well, but failed during the drought, there being no grass when examined later.

*Tall Oat Grass.*—When examined there were only a very few stools left standing, having suffered through the drought. It was sown at 28 lb. per acre.

*Tall Fescue Grass.*—Sown at the rate of 28 lb. per acre. It looked well when examined; the drought had had very little effect on it, and stock ate it well. It stood the best of all varieties tried on this experiment.

*Phalaris Bulbosa.*—Next to the tall fescue, it stood best. Only 24 oz. of seed were sown to the acre, yet the grass had covered nearly all the ground. It stood in full seed about 30 inches high, with young plants coming up all over.

*Cocksfoot.*—This was sown at 20 lb. per acre, but did not come to anything, only a few stools withstanding the drought.

*Spanish Sulla.*—Sown at 20 lb. per acre. It came up well, but failed from that time.

*Broad Red Clover and Giant Cow Grass.*—Were complete failures, not being able to withstand the drought which was prevalent throughout the period during which the experiment was conducted.

*T. F. Miller, Winston, Cathcart.*

Soil selected was a dark loam, fairly heavy. Was ploughed twice and harrowed. Seed was broadcast on 10th May, 1911, and harrowed in. Finally examined in April, 1913.

*Perennial Rye Grass.*—Was sown at 28 lb. per acre, and, for the first year, did splendidly, but it was cut too late, so that after seeding it gradually disappeared.

*Devon Evergreen Rye Grass and Italian Rye Grass.*—These were both sown at the rate of 28 lb. per acre, but the same fate fell to these two varieties as the perennial rye grass.

*Spanish Sulla, Broad Red Clover, and Giant Cow Grass.*—Failed to come up.

*Tall Oat Grass.*—This grass stood about 3 ft. 6 in. high when it was cut. It was sown at 28 lb. per acre, and, when examined in April,

1913, it was standing well, though it had been closely cropped by stock.

*Tall Fescue Grass.*—This grass germinated very badly, and, at time of examination, was very poor and sparse. Sown at 28 lb. per acre.

*Cocksfoot Grass.*—This was the best grass grown here. It was sown at 20 lb. per acre and germinated well, covering the ground thickly. At time of examination it did not show any signs of having been affected by the drought.

*Phalaris Bulbosa.*—This grass was also a success here, and was gradually spreading. It was sown at 24 oz. per acre. When examined it stood 30 inches high and full of seed.

*J. E. Holland, Olive Grove, Cathcart.*

Here a soil of a sandy nature was tried. Owing to the drought, the ground could not be properly prepared, so that at the time the seed was sown the ground was very lumpy. The seed was sown broadcast on 30th August, 1911, but the germination was so poor that the ground was ploughed over for a summer crop. The following varieties were tried: Tall oat grass, tall fescue grass, Italian rye grass, perennial rye grass, Devon evergreen rye grass, cocksfoot, *Phalaris bulbosa*, broad red clover, giant cow grass, and Spanish sulla.

*P. R. Day, Eversley, Komgha.*

Portion of an old land with white sandy soil was chosen. The ground was ploughed, disked, harrowed, and rolled. Seed was sown broadcast and the land was then cross-rolled as the ground was too dirty to harrow. Sown 8th June, 1911. The varieties tried were: Tall oat, tall fescue, *Phalaris bulbosa*, cocksfoot, Devon evergreen rye, perennial rye, Italian rye grass, broad red clover, giant cow grass, and Spanish sulla. These seeds germinated poorly, and when examined in July, 1913, there were only a few stools of cocksfoot left. The others failed through the drought.

*J. Keth, Brooklyne, Blaney, Kingwilliamstown.*

Soil selected was of a dark virgin loam, very well worked. Seed was sown broadcast, 2nd April, 1912, and harrowed in. Rain fell during the night, making conditions ideal for sowing. The plots were finally examined on 10th March, 1913, with the following results: These crops were not fed off at all by stock.

*Italian Rye Grass.*—This grass germinated freely, but did not stand through the drought, so that when examined it was poor and patchy.

*Timothy.*—Seed was sown at 24 lb. per acre. It germinated well, and when examined had covered the ground well. Good.

*Perennial Rye Grass.*—Sown at 28 lb. to the acre. It stood well until the dry weather set in when it died off considerably, and was poor and patchy.

*Sheep's Fescue.*—Sown at 28 lb. to the acre. It failed to germinate.

*Cocksfoot.*—This crop was in very good order when seen last. It stood thick and was sown at 20 lb. per acre. Very good.

*Hungarian Forage Grass.*—It was sown at 28 lb. per acre. When examined it was standing about 12 inches high without seed. It was sprouting and gradually spreading. Very good leaf growth.

*Meadow Fox Tail.*—Sown at 20 lb. per acre, it germinated freely, but did not stand the drought. At time of inspection it was very patchy and in poor condition.

*Tall Oat Grass.*—Was sown at 28 lb. per acre and germinated well. When inspected it had covered the ground well and was showing a good bit of feeding. Good. Stood drought well.

*Phalaris Bulbosa.*—Sown at 2 lb. per acre, it stood 2 ft. high in seed when inspected. It stood the drought well; looked as well as any of the other varieties.

*Kentucky Blue Grass.*—Sown at 20 lb. per acre, it had covered the ground exceedingly well, and, when inspected, stood 6 in. with no seed. It was spreading luxuriantly. Very good.

*New Zealand Tall Fescue.*—Sown at the rate of 28 lb. to the acre. It germinated well and stood the drought. When inspected it was standing 13 inches high without any seed at all. Excellent.

*J. B. Preston, Exwell Park, Waku, Cathcart.*

Soil was of a light sandy nature which was ploughed once and harrowed three times. It had been cropped for a number of years and then allowed to lie for two years. A severe drought was experienced throughout the season, not allowing a fair trial. Seed was broadcast on 12th February, 1912, and harrowed in. Inspected beginning of August, sheep's burnet was the only crop left standing. It was sown at 20 lb. per acre, and even this was sparse. The other crops, viz., Devon evergreen rye grass, tall oat grass, Italian rye grass, New Zealand tall fescue, cocksfoot, Hungarian forage grass, *Phalaris bulbosa*, and sheep's fescue, came up well, but failed through the drought.

*H. G. Perks, Sea View, Komgha.*

Here a sandy loam—virgin soil—was tried and seed sown in spring of 1912, but, owing to drought, crops failed entirely. The following were sown: Italian rye grass, Spanish sulla, Devon evergreen rye grass, tall fescue, Guinea grass, broad red clover, sainfoin, and giant white clover.

*H. G. Thompson, Holme Park, Komgha.*

Soil of a rich loam was selected, originally covered with "dobo" grass. Was ploughed once and harrowed three or four times. Seed sown 8th June, 1911, and harrowed in. Varieties tried: Tall fescue grass, Devon evergreen rye grass, tall oat grass, perennial rye grass, giant cow grass, cocksfoot grass, broad red clover, Italian rye grass, Spanish sulla, *Phalaris bulbosa*. They germinated well, but, owing to severe drought, failed altogether, and when examined in July, 1913, there was nothing left.

# Lucerne (*Medicago sativa*).

## FROM THE SEED-BED TO THE MARKET.

By H. A. Melle, Agricultural Assistant, Vryburg Experiment Station.

There appears no record of a time when lucerne was not in some portions of the world esteemed as one of nature's most generous benefactors to husbandry and an important feature of a profitable agriculture. Its beginning seems to have been contemporary to that of man, and, as with man, its first habitat was Central Asia. From that day to this it has been a plant held in high esteem wherever the best agricultural methods are in use, especially in dry and warm climates where irrigation is practised.

### The Name and its Origin.

In America lucerne is usually spoken of as "alfalfa." The following is taken from Professor's Coburn's work entitled "The Book of Alfalfa." The name "alfalfa" is from an Arabic word meaning "the best of fodder," which honour it certainly still can claim. Many writers have assumed that the name "lucerne," which it bears in France and England, was from the name of the Swiss canton Lucerne. This is a mistake, as it was not known there until long after it was cultivated in France and England. The name is probably from the Spanish word "userdas," which the French changed to "la-ouzendo" and later to "luzerne," still later to "lizerne," and then to "lucerne." Lucerne belongs to the botanical family Leguminosae, and is thus related to all clovers, peas, and beans. Its botanical name is *Medicago sativa*. It has blue or violet spikes and the leaves are pinnate trifoliate.

### Duration of Stand.

One of the valuable characteristics of lucerne is the long life of a well-grown, well-kept stand. In Mexico it is stated that fields of lucerne have been continuously productive without replanting for over two hundred years; and in the Cape Province an instance is reported where lucerne has been mown successfully for over eighty years. It follows naturally that such a deep-rooted and long-lived plant as lucerne should not come to full maturity the first year. As a matter of fact it is not until the third year that the full crop is secured.

### Adaptability.

While experts have been declaring that lucerne would only grow in certain soils and in certain climates, it has proven its adaptability to nearly all climates and almost all soils. It produces with a rainfall as scant as 14 inches and flourishes with 65 inches. It gives

crops at an elevation of 8000 feet above sea-level, and in southern California it grows below sea-level to a height of six feet or over, with nine cuttings a year aggregating ten to twelve tons per acre. On the Vryburg Experiment Station five light crops were reaped from the "Arabian" variety, sown March, 1912, on dry lands. The rainfall from December to April, i.e. during the growing period, was 9.86 inches. Mr. W. C. Hunt, of Doornbult, states that he has cut as many as twelve crops in twelve months from lucerne in his garden under irrigation and with a heavy dressing of kraal manure.

While it is true that lucerne may be grown by devoted enthusiasts anywhere, yet it has affinity for certain types of soils, and is most easily grown thereon. These soils are deep, pervious to air and water, well stored with mineral plant food, and somewhat alkaline in their nature. Thus lucerne revels in the arid countries, when water is supplied, because there has never been any leachings of mineral fertility and the land is generally very rich in potash, phosphorous, and lime.

Lucerne is certainly a voracious lime and potash feeder. The late Mr. Donald Stevenson devoted nearly eighteen months to investigations in lucerne. Amongst some of his results are the following analyses (see *South African Journal of Science*, Vol. VII, No. 3, Professor Hahn's paper):—

"One season's crop would take from one acre of soil:—

| Number ... | 1. | 2. | 3. |
|---|---|---|---|
| Phosphoric oxide ... | 67 lb. | 80 lb. | 86 lb. |
| Lime ... ... ... | 115 „ | 126 „ | 137 „ |
| Potash ... ... ... | 274 „ | 306 „ | 312 „ |

"The researches of the late Mr. Stevenson yield very interesting results:—

"(*a*) The growth of lucerne in our sunny climate is much more vigorous than in the moderate climate of Europe, and consequently the amount of mineral constituents, phosphoric oxide, lime, and potash, taken from the soil is very much larger than in Europe.

"(*b*) The average amounts of albuminoids in our lucerne is larger than in the lucerne grown in Europe and our lucerne-hay is more nutritious than the lucerne-hay from Germany or England."

### Soils on which it is Difficult to Grow Lucerne.

Any soil that is not more than three feet above the water line is too shallow for continued lucerne growth. On barren sands it is doubtful if it is worth while trying to establish lucerne fields. They must be continually fed in order to produce this forage, so rich in mineral elements, which mineral elements, it must be remembered, must come from the soil.

### Soils on which Lucerne will not Grow.

There are just two soil conditions that seem absolutely against the growth of lucerne. The first is a state of constant wetness.

Lucerne will not stand "wet feet." This invariably smothers the plants, in fact it usually kills any crop. The other kind of soil in which lucerne refuses to grow is one in which there is too much acidity. This is often the case where mealies and wheat have been raised for many years, thus robbing the soil of much lime—a condition that may be remedied by an application of lime to land just before sowing the lucerne. I do not believe that our sour veld will prove very satisfactory for lucerne growth. Mr. J. E. Wing, one of the greatest authorities on lucerne in America, holds that, to grow lucerne successfully, one requires lime, drainage, humus, and inoculation (here enumerated in the order of their relative importance).

## ROOT SYSTEM.

The mere mechanical effect of the extensive root system can scarcely be over-estimated. As soon as germination begins, the plant starts its tiny roots downward in the search of moisture. Roots four feet long have been found on lucerne four months old. On examining the roots of lucerne fifteen months old, grown at the Vryburg Experiment Station, it was found that they had gone down over four feet and penetrated through a hard layer of lime formation. The formation was so hard that it was scarcely possible to make any impression on it with a crowbar. Lucerne roots have been known to go down as deep as 139 feet.

After the taproot reaches a few inches below the surface, it sends out smaller roots that have a lateral growth of but a few inches, when they, too, take a downward course for moisture and for mineral elements needed for the growth above. These first smaller roots decay and others start out from the taproot lower down. These decay and still others start. The lateral rootlets evidently die off when they have exhausted the surrounding soil of the mineral constituents the plant requires. The decaying roots add humus to the soil and the openings left by them form a wonderful system of channels for the penetration of air and water into the soil.

An advantage possessed by lucerne and other leguminous crops is that they are not dependent on the soil for their nitrogen supply, but are able to utilize the free nitrogen of the atmosphere. It is a bacterium present in the soil which enables them to use the atmospheric nitrogen; and these bacteria form little wart-like nodules on the roots. Dr. Somerville states: "In some way or another, these organisms can evidently lay hold of and work up into organic compounds, the free nitrogen and afterwards hand it on to the plants on which colonies have established. This association of two organisms for the mutual benefit of both is not uncommon both amongst plants and animals. In the case we are considering the leguminous plant offers, as it were, houseroom to the bacteria, which, in return for the accommodation thus provided, convert the free nitrogen into such a form that it can be appropriated by the higher plant." The absence of nodule formation handicaps the plant seriously, for then the lucerne becomes dependent on soil nitrogen like any ordinary farm crop.

A number of observations have been made at Vryburg in search of these nodules on the roots, but none have yet been discovered. This is evidently due to the lucerne not being allowed to run to seed, and to the fact that nodules are said to form only after the

plant is two years old. On the other hand, experiments conducted at the Grootfontein School of Agriculture show that lucerne six months old, which has not yet reached the flowering stage, has a great abundance of nodules present on the roots. On the plot adjoining the lucerne experiments at Vryburg some cowpeas were grown, and their rootlets had a number of nodules, which were noticed only after the plants came into seed. Mr. Burtt-Davy writes: "In the Transvaal lucerne fields I have rarely been able to find many bacterial nodules present in the roots, and often none at all. The largest crop of them I have seen was in the field of the Hon. J. A. Neser, M.L.A., at Klerksdorp, in a moist, light, sandy loam. On transplanting some of these plants, together with a good deal of soil surrounding them, to the Botanical Experiment Station, Skinners Court, Pretoria, the lucerne grew, but the old nodules gradually disappeared, and very few new ones could be found." An instance is known where a certain plot of lucerne was repeatedly cropped just about the budding stage. After a while the lucerne seemed to make very poor and slow growth. It was allowed to run to seed and after that it made most vigorous growth. It is intended to ascertain the effect of allowing lucerne to go to seed and then examine the rootlets for an increase of nodules.

The establishment of a good stand of lucerne is dependent on three essentials; the man, preparation of the ground, and using the best quality of seed for sowing.

### Preparation of the Ground.

Many of the most successful growers begin their preparations two or three years before they sow their seed. There ought to be the most perfect physical condition of the soil. In preparing the land for lucerne intended to be irrigated, the ground should preferably be divided into beds. The beds should not slope so much as to cause erosion or allow the water to run over the surface without penetrating it more than a couple of inches; nor should it be a dead level, as drowning will take place in such spots. A gentle fall is the most suitable, ensuring sufficient penetration and at the same time causing no unnecessary wash and lodgment of water.

It must be remembered that lucerne in its early stages is a very delicate plant, hence the necessity for taking every precaution to have a deep and fine tilth and to give the lucerne a good start over its enemies. Under any land conditions as in Bechuanaland, almost any crop, except the sorghums, kaffir corn, and melons, may be grown to precede lucerne for the next season's sowing. The three crops mentioned should not be sown, as they take out too much moisture. In this part of the country, if possible, put on a liberal dressing of manure the preceding winter; plough deep in the spring and work to a fine tilth for the summer. As cowpeas do so remarkably well in Bechuanaland, they may be strongly recommended as a preceding crop. Cowpeas are a valuable forage, the hay being worth almost as much, pound for pound, as that of lucerne.

To summarize the above, work the land for two or three years before sowing lucerne. Apply a good dressing of manure the preceding winter. Plough deep the following spring and sow cowpeas as a preceding crop. Plough deep again, and work the fallow during the summer until the time for sowing.

Ploughing just before sowing is not recommended, as this causes loss of moisture and leaves the ground in too loose a condition. Good tilth is required, but at the same time the soil must be compact enough to give the rootlets a firm footing.

## SEEDING.

*Time to Sow.*—In America sowings are always made either in the early spring or late autumn. In South Africa most of the successful growers recommend sowing during the rainy season. It just comes to this, that sowing must be done when the ground is in a fit condition to receive the seed and the climate such that it will start the plants to grow vigorously, but at the same time assist in keeping down weeds. For Bechuanaland sowing in March is recommended, as by that time the weeds are harmless, having passed their prime, and if fallowing is practised we should have sufficient moisture to start the seeds germinating. The hot days—and some rain can generally be relied upon in March—will give the plant sufficient growth before winter sets in.

*Rate of Seeding.*—This will depend on many conditions, e.g. the vitality of the seed, condition of the surface soil, condition of the sub-soil as to moisture, the method of sowing, weather conditions at the time of sowing or immediately after, and also the natural fertility of the soil. For broadcasting in South Africa, the quantity ranges from 8 to 20 lb. per acre. With a good quality of seed, a suitable soil, and climatic conditions, 15 to 18 lb. is recommended.

*Selection of Seed.*—It is of the utmost importance that great care be exercised in the selection of seed. It should make an attractive market sample and exhibit high power of germination. It should be a clean sample and guaranteed free of all impurities and parasitic weeds, such as dodder. Care should be taken to obtain the particular variety of plant desired; that is, the seed must be true to name; in this country it is often necessary to rely solely upon the honesty of the vendor.

Other things being equal, seed of high germinating power is usually cheapest, because a less quantity is required and the resulting plants are usually stronger and more vigorous. A sample of seed of low germination capacity is usually in this condition, either because it is immature—that is to say, insufficiently ripened—or because it is too old, or because it has "heated" in the stack or at some other period of its history. This poor quality seed will produce plants so feeble as not to survive the first few weeks, or it may be days, especially under adverse conditions.

*Methods of Sowing.*—Broadcasting is most universally practised both in South Africa and America, although the experiment stations in America recommend drilling in preference to broadcasting. The advantages of a drill are, a more even distribution and uniform covering of the seed, also a more uniform distribution of soil moisture. The general opinion is that by sowing with a drill one will use much less seed. For seed purposes, in America, on dry lands, lucerne is drilled in rows 3 feet apart and cultivated the same as mealies. The lucerne at Vryburg is drilled in rows 2 feet apart at the rate of 8 lb. per acre. Two feet between the rows is found sufficient for inter-cultivation. Mr. G. J. Bosman, Lecturer on Agriculture, Grootfontein School of Agriculture, who has

had personal experience on a lucerne ranch in the Western Dryland States, America, says that "they also sow broadcast with good results. Of course every care is taken in conserving as much moisture in the seed bed as possible to ensure germination."

*Nurse Crop.*—Many people still practise the method of sowing their lucerne with a nurse crop. These people, it is feared, overlook the fact that, by having a nurse crop, they cut off the rays of the sun from the lucerne. Lucerne is essentially "a child of the sun." Besides, lucerne, when young, is very easily smothered by other plants. Only under certain exceptional conditions, such as to prevent erosion, etc., under irrigation, is there any sufficient reason for practising this method.

### IRRIGATION.

Whenever it is possible to do so, lucerne should be sown under a well-laid-out irrigation scheme. The best results have always been obtained under irrigation. Although lucerne responds very readily to the practice of irrigation, yet this method can be abused. It is an established fact that lucerne, in its very young stages, generally gives better results if not irrigated. The germination and stand of lucerne are generally found to be better when brought up by rain. By having the surface too wet at the time of sowing a crust forms and evaporation sets in so rapidly as to be detrimental to germination and to the growth of the young plants. Lucerne should, if possible, not be irrigated until it has attained a growth of a few inches, weather permitting, say about six to eight weeks after sowing. Willcox, in his "Irrigation Farming," says:—"The critical time with alfalfa is the first six weeks of its growth. Flooding during that period is quite certain to give the plants a backset from which they seldom fully recover before the second, and sometimes not before the third, year, and it is not often in the arid States that rain falls with sufficient frequency to dispense with the necessity for irrigating the plants while small. By soaking the earth from thirty-six to forty-eight hours before seeding, however, the plants will make vigorous growth until they are ten to twelve inches high, after which they may be irrigated with safety. When alfalfa has become established a single copious irrigation after each cutting will ordinarily be found sufficient to ensure a crop."

### CULTIVATION.

There are many useful implements on the market for cultivating lucerne. It is surprising to see what an amount of cross-cultivation lucerne can stand. During the last year's drought at this station four and five months' old lucerne was cross-harrowed as often as five times. The lucerne withstood the drought remarkably well, whereas in the adjoining plots a number of indigenous and foreign grasses all succumbed (with the exception of *Phalaris bulbosa*), although they received better treatment in that they were cultivated between the rows. Very good results have been obtained by discing. Discing splits the crowns, which tends to make the plant stool more.

### VARIETIES.

The principal varieties grown in this country are Provence, Arabian, Tamworth, Hunter River, Peruvian, and Turkestan.

*Provence* is the best known and has been cultivated with universal success for a number of years.

*Arabian* is a comparatively new introduction, but has made rapid strides during the last two years and is now very popular. This variety is much thought of in America. It grows quicker, bears more crops per season, and grows in a lower temperature than ordinary lucerne. The leaves are thinner, larger, and more hairy. The stalks, when green, are very succulent. Horses, and vermin such as hares and buck, seem to prefer it to the other varieties. Owing most probably to its vigorous growth it does not appear to be affected so readily by insect pests.

*Tamworth and Hunter River.*—Messrs. C. Starke & Co. comment as follows:—" Tamworth and Hunter River probably differ only to a very small extent as they are grown in districts which are not very far apart, but the Tamworth variety is grown at a greater altitude than the other, and for this reason it possibly may be found superior for many districts where lucerne is grown at a high altitude. These two varieties, as well as Arabian, stand the cold very well and often give a fair amount of growth in mid-winter."

*Peruvian* is very similar to Arabian. It is characterized by its long-growing season and lack of hardness.

*Turkestan* has been tried to a considerable extent, but very few report favourably on it. It is a very slow grower, although at Doornbult three cuttings were obtained from it last season. It stools well along the ground and has a great deal of leaf surface.

## ENEMIES.

The two great enemies of lucerne at Vryburg so far appear to be:—

1. Lucerne caterpillar (*Colias electra*), a yellow butterfly which in the larval stage is a smooth green caterpillar that feeds ravenously on the lucerne. These caterpillars, when once they establish themselves in a lucerne field, will play havoc with the crop. They will destroy a young stand of lucerne in a matter of a few days. Mr. Lounsbury, Chief, Division of Entomology, recommends for the eradication of this pest the cutting of the lucerne when the damage threatens to be great. If lucerne is under irrigation a good method is to continuously flood it. By this means a disease will be introduced amongst the larvae known as "caterpillar wilt disease." The caterpillars do not seem to do much damage amongst the quicker-growing varieties.

2. Spring Hares.—All farmers will probably know of a more effective way of destroying this pest than can be suggested by the writer. But, if it is intended to plant the Arabian variety, the camp should be enclosed with wire-netting. Spring hares seem to be passionately fond of Arabian lucerne. They are not content with the foliage, but will uproot the plants.

As far as is known, dodder has given no trouble as yet in this part of the country. It is not likely, however, that this blissful state of things will continue. Dodder is a parasite which grows from its own small seed, but attaches itself very soon to the lucerne stalk. Its appearance may be described as a tangled mass of thin yellow or brown strands, resembling the tassel of ripening mealie cobs, which spread themselves upon the ground twining round the stems of lucerne. The flowers possess a sweet but sickly smell. For an excellent article on dodder, see "Dodder and its Eradication," by Dr. E. A. Nobbs, in the publication "Money in Lucerne."

### TREATMENT OF YOUNG LUCERNE.

The life of a lucerne plant will largely depend upon its treatment when young. Weeds often come up to crowd the young lucerne. To destroy these weeds mow the crop with the mower, setting it to run as close to the ground as possible. If a mower is not available use a sickle—the labour of cutting it will repay every time. On no account allow animals to graze on young lucerne. It is better not to pasture lucerne until it is three years' old. By cutting young lucerne the growth is stimulated, but by pasturing the reverse is the effect. Another point to remember is not to allow lucerne to run to seed the first season, as this tends to set back the plant considerably.

### HARVESTING.

The first point to accentuate on this subject is the great value of the leaves. These contain from 75 per cent. to 80 per cent. of the protein of the whole plant—that valuable compound that goes to produce milk and meat. It is estimated that the loss in leaves in harvesting ranges from 15 to 30, or more, per cent. It is readily seen that the harvesting is an importaint part in lucerne-hay making.

*When to Cut.*—The time to cut lucerne is when it has begun to bloom—say, about a tenth in bloom—just as the lower leaves begin to turn yellow and drop off and buds start out from the base of the stems. Cut now, for it contains then the greatest quantity of nutrients. If allowed to stand longer the stems become woody, some of the leaves are lost, and the hay is not as palatable, nutritious, or digestible.

*Making Lucerne-hay.*—J. E. Wing says:—"There is a principle to be observed in making alfalfa-hay that applies to making hay from all clovers. If it can be so managed that the leaves are not at once burned and dried to powder the moisture from the stems is the most easily removed. Leaves are natural evaporators of sap; stems are not. Therefore, while the leaf has yet pliancy and some semblance of its natural condition, it is most effectively carrying away the sap of the stem, but when it is dried up it no longer aids in drying the plant at all. Therefore the best hay in all respects is made partly in the shade, in loosely turned windrows, or in narrow cocks." During hot, dry weather it is better to cut for hay making during the cooler part of the day, preferably in the afternoon. Allow it to be in the swath until the leaves become wilted, then rake into windrows and later into cocks. The time from cutting to making into cocks will depend entirely upon the climatic conditions. The art of making good lucerne-hay is only to be acquired by practice.

*To Test for Sufficient Dryness.*—Before stacking the hay, it must be sufficiently dry in order to prevent over-heating in the stack. A simple test is to take a wisp of hay, choosing a damp part of it, and twist it violently into a rope. If no moisture can be made to exude from the stems the hay may be put into the stack. If only a small quantity of hay is to be made it should be well dried before stacking, since it is more apt to become musty than when a large amount is piled together.

*Stacking.*—Stacking the hay directly on the ground is sure to mean a loss of some portion of it. Elevate the bottom of the stack with timber and put straw at the bottom, also preferably build a rick rather than a round stack. Start the bottom 12 to 14 feet wide and

build straight up. Keep the stack full in the middle, or a little higher than the sides, and well tramped all the time. When the stack has reached the desired height, top it with grass, if possible, as grass sheds water better than lucerne, or, better still, cover it with tarpaulins well weighted down.

### ADVANTAGES OF LUCERNE.

(1) That it roots so deeply in the soil. It is considered that lucerne roots penetrate as deep as there is any soil. Thus the whole soil is utilized.

(2) That the plant uses the whole growing season. It is very hardy and does not much mind cold. In spring, as soon as the weather becomes warmer, the lucerne is up and growing. The number of cuttings you will obtain will depend upon the amount of moisture in the soil and your local climatic conditions.

(3) The forage that the lucerne plant produces is the richest and the most palatable that the farmer can grow. The hay, if properly cured, is very rich in protein. It is the best feed for the baby on the farm—for the baby colt, the baby calf, the baby lamb, pig, and chick.

### PASTURING.

In some respects lucerne does not seem to be a natural pasture plant. The stems are delicate, it will not thrive in a hard trampled soil, and the crowns when broken off will not readily revive; if some of the plants flower and drop their flowers early in the season, they lose vigour. Not an animal should be turned on to a lucerne field until the second or third year if it is desired that the stand endure for several years, nor should it be pastured too early in the spring or too late in the autumn. There should be something of a growth left for winter protection. Careful lucerne growers are known who pasture their older fields, but never put on a full quota of stock until they have cut over the field when the plants are first coming into bloom. They insist that this cutting invigorates and gives the plants new life.

### FEEDING LUCERNE TO STOCK.

*Horses and Mules.*—There is no *one* thing so good as lucerne for the working horse. It builds up his wasting muscles, it keeps him strong and healthy. He needs much less grain when he can have lucerne-hay. It is necessary to remember that this hay should be fairly mature when it is cut, and well cured, and that it should not be mouldy or musty. For old and hard-worked horses in thin flesh lucerne has great restorative powers; for horses doing fast work a little grain should also be given. It should be constantly borne in mind that well-cured lucerne-hay is nearly as rich as wheat bran, so that to feed too great an amount of it is not merely wasteful, but puts an undue strain upon the excretory organs to eliminate the unnecessary food substance from the tissues. Lucerne is second to no other feed for the mare while she is carrying her unborn foal. Lucerne being a voracious lime, potash, and phosphorous feeder it is without parallel as a bone maker for young horses.

*Cattle.*—Heifer calves raised on lucerne develop rapidly and are ready to become mothers earlier than when developed on other foods.

Cows in milk fed on lucerne-hay as part of their ration give milk as with no other possible combination. The great dairy authority, ex-Governor Hoard, has found in practice that with a combination of lucerne-hay and good sweet mealie silage, and as little as from four to five pounds daily of grain, not only has he had the maximum returns in milk and cream, but he has seen the dairy herd maintained in remarkable health and vigour. Mr. Wing writes: "Fattening cattle are desired to be fattened as rapidly as possible; why, therefore, need they be fed any foods rich in protein? Why not feed them in the old-fashioned way with corn (mealies) alone, to quickly cover their ribs, and then let them go forward to market? The theory sounds well, but does not work well in practice. These animals find waste going on in their own systems. Digestive processes require muscular action, and there is need to repair muscular tissue. Nerve force is to be maintained. Then, after all, when the animals come to the feed lot they seldom have an adequate frame of lean tissue on which to build the fat. Moreover, the modern trade demands lean flesh intermixed with fat, not fat laid on in masses. And, finally, digestion goes on better when there is fed a variety of foods containing both fats and muscle builders. So theory backs up practice, and that tells that steers fatten more quickly, more cheaply, and better when they have all the alfalfa-hay they want in combinatoin with corn." Oxen are said to fatten in from ten to sixteen weeks if grazed on lucerne.

*Sheep.*—Sheep prefer lucerne above all other forage, and for a good reason. It is the one thing best suited to their needs. They, more than other animals, need a ration rich in protein. Think for a moment what it means for an animal to like a food. Liking in the animal world is not whim or caprice. Man is the one animal, save a worm, that chews tobacco, the only animal that drinks whisky. All animals crave things that are good for them. Why do they hunger for fitting foods? Because the very cells of their bodies are calling to be built up, and this instinct tells them that tough grasses nourish feebly, if at all; that tender, rich lucerne leaves and stems have in them substances which, when assimilated, go directly to build the eager body cells, to reinforce the muscles and strengthen the bones and brace up the nervous system. Sheep, when once accustomed to a diet of lucerne, will scorn veld grass.

What has been said of the mare applies as well to the ewe and cow.

*Dangers to Cattle and Sheep.*—The greatest objection to pasturing lucerne is its bloating effect upon cattle and sheep. Pigs and horses do not suffer. Professor Coburn drew up the following rules for pasturing:—

At the beginning of the pasturing season give animals a heavy feed in the morning before turning upon the alfalfa.

Have water in the pasture all the time.

Keep the animals in the pasture night and day, after they have become accustomed to it, until removed permanently.

Use upland in preference to bottom fields for pasture.

Watch the stock closely the first few days and remove those permanently that show symptoms of bloat.

Sow blue grass, brome grass, or meadow fescue with alfalfa in fields intended for permanent pasture.

*Pigs.*—Farmers claim that pigs a few weeks old turned into a lucerne field derive almost their entire living from it, and leave their mothers two weeks earlier than when fed otherwise. Great care must be observed not to overstock a lucerne paddock with pigs, as they will then uproot the plants in a very short time.

*Poultry.*—The lucerne field is a rich storehouse for the poultry-keeper. In summer the fowls forage far and wide, eating the tender leaves rich in protein, and, incidentally, all the insects. Fowls given all the lucerne that they desire are more healthy and lay more eggs than without it.

*Lucerne as an Appetizer.*—The high feeding value of lucerne is largely due to the chemical compound known as protein; its extreme digestibility is another desirable quality, and not the least is its appetizing character. Not only do all animals like it, but when given in moderate quantities it seems to increase the general appetite for more fat-making feeds. Animals fed on lucerne grow in weight, but the weight is principally of bone, blood, and muscle. It is without a sufficiency of fat and carbohydrates, and these should be supplied by the addition of such foods as mealies and kaffir corn. When lucerne is fed alone, all the protein cannot be digested, and it is, therefore, always economical to add some carbonaceous foods if animals are fattening for market.

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The following list of "Don'ts" is adopted from Professor Coburn's "Book of Alfalfa":—

Don't sow any nurse crop.
Don't sow on freshly ploughed land, no matter how carefully prepared.
Don't let weeds or grass grow over 6 in. high without mowing.
Don't clip or mow when wet with rain or dew.
Don't let alfalfa stand; if turning yellow, cut it.
Don't sow old seed.
Don't sow less than 20 lb. per acre, half each way.
Don't sow twenty-five acres first, sow five.
Don't pasture it.
Don't depend upon "culture cakes" or soil from some distant field.
Don't let any water stand on it.
Don't let it go if a thin stand, but disc in more seed; don't be afraid you will kill it.
Don't replough the land, disc it.
Don't wait for it to stool, it never does.
Don't try to cut for hay until the alfalfa takes the field.
Don't sow on land not well under-drained.
Don't leave your land rough; use a roller or a plank float to level and smooth it.
Don't give up.

# Botanical Notes.

By Miss S. M. Stent, Herbarium Assistant, Division of Botany.

## Water Hyacinth (*Eichornia crassipes*).

A few years ago a water-plant known in America as the "Florida water-pest," and in Florida by the significant name of the "Lilac Devil," was introduced into Capetown. To those who, knowing the dangerous nature of the plant, kept it within bounds in the purely ornamental waters of ponds and fountains, it was fairly harmless, but the great beauty of the spikes of mauve flowers and the quaint formation of the leaves made it seem desirable and attractive, and the plants were carried to other towns by individuals anxious to beautify their vleis and dams and ignorant of the pest they were spreading.

Worcester was one of these towns, and the municipality there has suddenly awakened to the danger in their waters. The following is an extract from a letter received from a correspondent of that town: "We have a plant growing here in a dam, a spring fountain, and in various flower gardens in the town. A couple of years ago this plant was brought into the town, and three pieces planted in a fountain of about eight yards diameter, and also in a dam of about twenty-five yards diameter. It has choked up the fountain and also the dam. What fish were in the fountain died, and now the municipality are clearing the fountain. The dam has already been cleared. This plant spreads with great rapidity, and I am told that it is the same as is at present costi- g the United States many thousands of dollars to clear from the rivers in Florida and adjacent States.

"Our town is situated on the Breede River (at least not far from it), and if this plant were to get a hold in this river then large areas of it will be choked before long, and the grazing value of the large backwaters (water when the river is high, but gradually drying as the river recedes) will be utterly ruined.

"I am writing now, as to-day two scotch cart loads were taken to the railway station for transport to Wolseley Station. It was intended to tip this stuff near Wolseley into the Breede River. Our local station master was asked to transport it over the railway, and arrangements had been made with some one at Wolseley to deal with it. I got our Mayor to forbid the stuff being taken away. It was thought it would look very fine if this stuff grew along the railway in the large sheets of water this side of Wolseley."

The water hyacinth is a native of tropical America, and was introduced into the St. John's River, Florida, towards the end of the Nineteenth Century. It grew luxuriantly, bearing masses of lovely mauve flowers, and spreading rapidly. It finally developed into a terrible pest, impeding navigation, and costing the Government thousands of pounds in its eradication.

In Australia also this aquatic has been introduced, with the same results. The Inspector of Agriculture, writing in the *Agricultural Gazette of New South Wales* of 2nd June, 1911, says: "Like many other pests, the hyacinth was introduced and planted in the district.

Twelve years ago, a couple of small, wilted, insignificant-looking plants were procured from a home in one of the suburbs of Sydney and placed in Swan Creek, situated four miles below South Grafton, on the Clarence River. They were introduced innocently, with the object of beautifying the creek. The hyacinth, once liberated, thrived so well that in two years it took complete possession of the creek, which in this particular locality is about 50 yards wide, and varies in depth from 10 to 35 feet.

"During the flowering season the creek was a pretty sight, and lovers of flowers visited the locality from all parts of the district. Each, in departing, carried a small plant or two to place in water-courses near his or her own home, so it was not very long before the hyacinth was innocently introduced to all parts of the district. Every flood or strong fresh in the Clarence or Richmond Rivers brings down acres and acres of hyacinth, which become a danger to navigation. During January of this year the hyacinth was responsible for suspending ferry traffic at Grafton and on the lower Clarence several punt wires were broken. In many of the 'clumps' of hyacinth, which reached a quarter of an acre in extent, logs were to be found, and some idea of their danger may be estimated when it is remembered that these were being carried down with the current at the rate of from four to six knots an hour.

"Efforts have been made on several occasions to get rid of the pest, and at Swan Creek alone a sum of something like £800 was expended by the late Sir John See in taking the hyacinth out. This work was never completed, however, with the result that in a few years the whole of the creek was again covered."

. . . . . . . . . . . . . . . . . . . . . .

"In travelling through the district, one is rather surprised at the utter indifference shown by many farmers, and one cannot quite understand why no effort is made to take out a few stray plants that have made their appearance in the creeks or lagoons that perhaps provide their only supply of water for stock. This would not take more than a few minutes, or an hour or two at the most, and numerous instances might be given where a few years ago a couple of hours' work would have eradicated what now would take hundreds of pounds to do. This indifference may be partly due to the fact that it is very generally recognized by the farmer that the hyacinth will only block navigation, either to boats, droghers, or ocean steamers, and that does not affect him."

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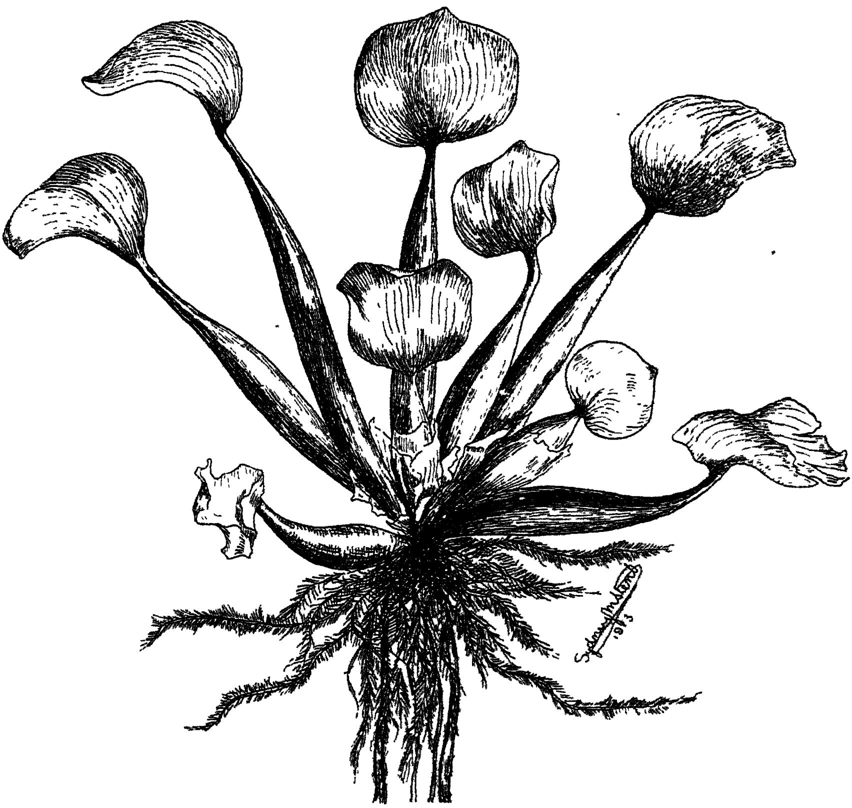
"On hundreds of farms on the north coast the only supply of water for farm stock is obtained from lagoons, creeks, or blind water-courses. When the hyacinth becomes established, such water is rendered unfit for drinking purposes. The decomposing plants give off most offensive smells, the water becomes inky black and putrid, and stock will not touch it. Along the banks of Alumny Creek, portion of which runs through the city of Grafton, the odours arising during the summer months are most obnoxious, and whilst no direct sickness may be attributed solely to this cause, at the same time it must be admitted that such a state of things is not conducive to health.

"In drought times the only green feed available for stock in many localities consists of the hyancinth, which they eat readily. At such periods the animals are in a more or less emaciated condition, and as

the weed is eaten to the water's edge along the creek banks, the animals have to reach farther to secure the necessary amount. In doing this they frequently slip in, and when once they get below the dense mass of entangled root growth they cannot get out again, and unless human aid is immediately forthcoming the animals are speedily drowned. In one portion of the Clarence district alone last year several landowners were kept employed daily for some weeks lassooing and pulling out beasts that had slipped into the creek; and notwithstanding these precautions some sixty or seventy head were lost."



WATER HYACINTH (*Eichornia crassipes*).

*Eichornia crassipes* is purely an aquatic; it has a mass of feather-like roots, and while in shallow water it sends down long ones which fasten in the mud at the bottom, it thrives equally well in very deep water, where it is entirely a floating plant kept up by the swollen air-filled leaf-stalks. It spreads by means of seeds, which it bears in great numbers, and by rhizomes, from which spring new shoots, and which eventually become detached from the parent plant. These mature plants soon get forced beneath the surface by the new growth, and sink to the bottom, where gradually a mass of decaying matter is accumulated. There being but little navigation on our South African rivers, the chief danger we have to fear from this "Lilac devil" is


ARISTIDA CONGESTA.
A—Valve, showing three branched awn and the sharp callus or hardened part at base.

its introduction into the vleis, dams, ponds, irrigation furrows, etc., which will not only become choked with the living plants, but the waters of which will be rendered unwholesome and unfit for use by human beings or stock by reason of the accumulation of dead and decaying plants at the bottom.

It therefore behoves every one to give this beautiful "Lilac devil" a wide berth, and not be lured into introducing it into even purely ornamental waters.

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*Aristida* spp.

The *Aristidas* belong to a class of grasses which have on the whole very little value as fodder plants; they soon become hard and wiry, and stock will only eat them when there is no other foodstuff to be found.

The large and small "Bushman grasses" (*Aristida ciliata* and *Aristida nobtusa*) are two of the best of these, and form the principal food grasses of the Kalahari.

Apart from their uselessness for fodder, these grasses are often the cause of considerable trouble to farmers; the sharp, awned part of the spikelets breaks easily away as the animals brush against them, and gets into their nostrils, eyes. and flesh, causing in some cases a good deal of injury.

We had recently sent to us about six inches from the flank of a slaughtered sheep, and in this small space there were not less than twenty of these spikelets embedded in the flesh, which, however, appeared to be in a perfectly healthy condition, though considerable irritation must have been felt by the sheep.

Another recent case was that of a dog who developed a bad cystic tumour, caused, so wrote his owner, by a "thorn" having gone very deep into the flesh. This "thorn," which was sent to us for identification, proved to be the sharp-pointed part of a spikelet of *Aristida* sp. It had penetrated far enough to injure the covering membrane of the sternum, leaving a traceable lump on that bone, and producing a bad tumour, with three separate cysts, which had to be operated on.

Our illustration is of one of the commonest of this genus, *Aristida congesta*. The drawing A is of that part of the spikelet that breaks away; note the characteristic three-branched awn from the tip of the valve, and the sharp-pointed base which penetrates into the skin, and the thick ring of hairs above the point which prevent its backing out again. One has only to walk through a field containing a quantity of this grass to realize its penetrating quality.

The species of *Aristida* differ very much in appearance; they are tufted grasses with narrow leaves, often curled, the panicle or inflorescence is in some species contracted or spikelike, as in our illustration, and in others open, the spikelets separate on fine pedicels or stalks. Some have the awns smooth or slightly rough, and in others the middle or all three branches are feathered as in the "Bushman grasses," but in nearly all the callus at the base is sharp and hard, and surmounted by a tuft of hairs.

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*Plantago lanceolata* Linn., known as "lambs' tongue," "rib grass," "black plantain," "lance," or "narrow-leaved plantain," "riple grass."

The seed of this plant is usually introduced into the country as an impurity in lucerne and clover, etc. It has a certain feeding value, and withstands drought and frost, but is a dangerous pest in cultivated lands, especially in lucerne fields, as it will gradually increase and choke out the lucerne.

An illustration of this apeared in the July *Journal*.

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*Bromus maximus* Desf., "Broncho grass." A very injurious introduced weed. The long barbed awns are often injurious to stock, getting into their eyes and nostrils, and, as a rule, they dislike it as fodder even when young. It is very hardy and drought-resisting, and for this reason soon chokes out other better grasses. It is said that in California thousands of acres of good grazing veld have been ruined by it. It should therefore be strenuously fought against wherever it appears.

An illustration of this grass appeared in the July *Journal*.

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# Export of Fresh Fruit, Season 1913-14.

THE following is a copy of the Government regulations dealing with the export of fruit for the coming season.

Some few amendments and alterations have been made in those previously in force, and whilst none of these is of very great importance attention is called to their incidence as follows:—

1. The shipment of grapes in crates, which must be a multiple of the measurements of the grape box.
2. The standard orange box has been made available for use for the export of *Queen* pines.
3. The half orange box has been deleted.
4. An addition of four varieties of early apples is made to the list of those which may be exported.
5. Minor alterations chiefly in the reduction of standard sizes of pears and the addition of Magnate to the approved list.
6. A list of early peaches is given, any of which may be classed as Alexanders. The yellow-fleshed peach Elberta will be passed for export, as also will Early Rivers.
7. There is a reduction in the size of early Cape apricots.
8. Burbank is added to the list of plums.
9. Additions have been made to the approved list of grapes for export of Black Hamburg and Gros Maroc.
10. The weight limit in Queen pineapples has been reduced from 1½ to 1¼ lb.

11. A recommendation has been introduced that thin-skinned oranges be packed separately, and that boxes containing such shall be marked "thin skin" on one end.

R. A. DAVIS,
Chief, Division of Horticulture.

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It is hereby notified for general information that inspection by the Government of fruit intended for export will be subject to the conditions set forth hereunder from and after the date of this notice and until these conditions are amended.

Facilities for the cold storage of fruit at East London, prior to shipment, not being adequate, inspection will for the present take place at the ports of Capetown, Port Elizabeth, and Durban only.

The inspector will furnish full reports, as required, to the exporters as to faults in packing, misnaming of varieties, marking of boxes, condition of fruit selected, reasons for rejecting, and other points which may be of assistance to exporters.

Information with regard to graders and other matters connected with the export of fruit can be obtained from the inspectors or this Department.

Exporters or their representatives may be present at the inspection of their fruit.

F. B. SMITH,
Secretary for Agriculture.

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CONDITIONS.

1. Each exporter who wishes the Government inspector to inspect his fruit prior to its exportation must previously complete an agreement with the Department of Agriculture, in the following form:—

*Request for Inspection of Fruit for Export.*

Address...........................................
...........................................
Date...........................................

I/We hereby desire that, until such time as I/we withdraw this request in writing, all fruit which I/we export may be inspected at the port of....................................by the Government Fruit Inspector; and I/we bind myself/ourselves to accept and conform to the conditions of inspection contained in Government Notice No. ...........of.........................

I/We desire such inspection to commence from.................... ..........................

My/Our fruit boxes will bear the following distinctive mark, namely....................................

Signature..................................

The Government Fruit Inspector,
The Harbour,
Capetown, Durban, or Port Elizabeth.

2. The name, address, and distinctive mark of the applicant will be registered, and he will be informed of such registration by the inspector.

3. Inspection of the applicant's fruit will follow *ipso facto* the receipt by the inspector of the above request.

4. Every box of fruit passed by the inspector will be branded by him with the Coat of Arms of the Union of South Africa, encircled by the words "Passed by Government Inspector."

5. For each consignment examined by the inspector a charge at the rate of one shilling per 40 cubic feet will be made to the exporter on all boxes going twenty-five to the ton and under, and one shilling and sixpence for all boxes going over twenty-five to the ton.

6. The disposal of boxes of fruit not passed and branded by the inspector as provided in condition *four* can be arranged by the exporter with the Harbour Department of the Railway Administration or with an agent at the port of shipment. The Department of Agriculture accepts no responsibility with regard to the disposal of such fruit.

7. The exporter must pay the charge for the cold storage, required by condition *thirteen*, and make his own arrangements for the disposal of his fruit oversea.

8. The size of box in which the fruit is packed for export must be:—

| | *Outside Measurement.* |
|---|---|
| (*a*) For pears, peaches, nectarines, apricots, plums, grapes, and melons | 18 by 12 inches, or 24 by 18 inches, the depth being optional. |
| (*b*) For pineapples, Cayenne variety (Giant Kew) | 27 by 26 inches, depth optional. |
| Queen variety ... ... ... ... | 27 by 14 inches, depth optional. The standard orange box may also be used. |
| (*c*) For citrus fruit: | |
| Oranges ... ... ... ... ... | 26 by 12½ by 12½ inches, or 26 by 12½ inches, depth optional, for single-layer boxes only. |
| Naartjes ... ... ... ... ... | 18 by 12 inches, depth optional, and for half-cases, 24 by 12 by 6 inches. |
| (*d*) For mangoes ... ... ... ... | 18 by 12 inches, depth optional. |

Grapes may, however, be shipped in crates, which must be a multiple of the grape box mentioned under (*a*).

9. Every box of fruit submitted for inspection must be clearly marked, *on the end thereof*, with

- (i) the registered mark of the exporter (or his name or other means of identification);
- (ii) the grade ("extra selected," "selected," or "graded"), except in the case of grapes, melons, oranges, naartjes, and mangoes;
- (iii) the variety; and
- (iv) the exact number of fruits contained in the box.

10. Every box of fruit submitted for inspection must be consigned to the Dock Goods Superintendent, Capetown; the Port Goods Manager, Port Elizabeth; or the Port Manager, Durban, direct, or to him through an agent, and bear *on the top of the box* the shipping mark of the agent appointed by the exporter to dispose of his fruit oversea.

11. (*a*) Each pear, peach, nectarine, plum, apricot, orange, naartje, and mango must be wrapped in or surrounded by tissue or other suitable paper.

(*b*) Grapes must be wrapped in or surrounded by tissue or other suitable paper.

All fruit, including pines, may be placed in wood-wool or other suitable packing material.

12. (*a*) All fruit must be of first-rate quality, free from blemishes affecting the appearance of the fruit, evenly graded and uniform in size, and of the characteristic shape of its variety.

(*b*) Only one variety of fruit may be packed in a single box, except fruit consigned to private order, in which latter case the box must be marked, *on the end thereof*, "private order."

13. (*a*) All fruit for inspection, other than citrus and pine fruits and fruit intended to be shipped in ventilated hold, must be in an approved cold storage store forty-eight hours previous to shipment, and in the case of fruit placed in an approved *private* cold store the exporter or his agent must produce to the inspector a certificate to that effect, signed by a person approved by the Department of Agriculture for the purpose.

(*b*) Fruit placed in private approved cold stores at the port of shipment will be inspected by the inspector at such stores provided that forty-eight hours' notice be given to the inspector by the exporter or his agent. Fruit so stored must be conveyed to the harbour in refrigerator trucks.

(*c*) Citrus and pine fruits will be accepted for inspection to within twenty-eight hours of the sailing of the vessel for which they are intended.

14. Any box containing fruit which fails in any of the requirements of the conditions *eight*, *nine*, *ten*, *eleven*, *twelve*, or *thirteen*, or is of the variety specified hereunder as not recommended for shipment, or unsuitable, or is wrongly named, or in any other way does not conform with any condition of this notice, will not be passed by the inspector. (Such fruit, if not citrus fruits or pines, would, in consequence, if shipped, be charged by the Union-Castle Co. at a higher rate of freight, or, if citrus fruits or pines, go forward in ventilated hold.)

15. Subject to appeal to the Board of Reference mentioned in condition *sixteen*, the decision of the inspector as to whether any box of fruit should be passed by him or not shall be final.

16. Any exporter or his agent who is dissatisfied with any decision of the inspector in terms of condition *fifteen* may appeal to the Board of Reference appointed at the respective port, namely: Messrs. Maynard Nash, T. L. Watermeyer, and A. A. Persse in Capetown; Messrs. T. S. White, W. R. Hansen, and J. A. Westbrook in Durban; and Messrs. J. W. Whitehead, A. Baldie, and C. H. Mackay in Port Elizabeth. The decision of the Board on the question submitted to it shall be final.

17. The undermentioned are the minimum sizes of fruit which can be submitted for inspection as "extra selected," "selected," and "graded" respectively. Owing to shrinkage it is recommended that, when packing, exporters grade all fruit one-eighth inch larger than the sizes mentioned.

### (*a*) APPLES.

No minimum size is fixed, but the fruit must not be small.

Varieties ripening prior to Ribstone and Jonathan, with the exception of Five Crowns, Irish Peach, Tom Putt, and Colville Aromatic, *will not be passed*.

## (b) PEARS.

| VARIETY. | GRADES. "*Extra Selected*" (*diameter*). | "*Selected*" (*diameter*). | "*Graded*" (*diameter*). |
|---|---|---|---|
| Bon Chretien ... ... | 2¾ in. | 2½ in. | 2¼ in. |
| Doyenne de Comice ... | 3 " | 2¾ " | 2½ " |
| Louise Bonne... ... | 2½ " | 2¼ " | — |
| Beurre Bosc ... ... | 2¾ " | 2½ " | 2¼ " |
| Winter Nelis ... ... | 2¾ " | 2½ " | 2¼ " |
| Beurre Hardy... ... | 2¾ " | 2½ " | 2¼ " |
| Clout Morceau ... | 3 " | 2¾ " | 2½ " |
| Clapp's Favourite ... | 3 " | 2½ " | 2¼ " |
| D'Angouleme .. | 3½ " | 3 " | 2¾ " |
| Beurre Diel ... | 3½ " | 3 " | 2½ " |
| Gansel's Bergamotte... | 3 " | 2½ " | 2¼ " |
| Josephine ... ... | 2¾ " | 2½ " | 2¼ " |
| Beurre Superfine ... | 2¾ " | 2½ " | 2¼ " |
| Flemish Beauty ... | 3 " | 2½ " | 2¼ " |
| Rustenburg ... ... | 3 " | 2½ " | 2¼ " |
| Forelle... ... ... | 2¾ " | 2½ " | 2¼ " |
| Magnate ... ... | 2¾ " | 2½ " | 2¼ " |

The varieties known as White Doyenne, Pitmaston Duchess, Cape Kalabas, Safraan, Souvenir du Congres, Winkfield, Clairgeau, Easter Beurre, Fertility, Durandeau, Le Comte, Capiaumonde, Keiffer, Bergamotte, December, and Jargonelle *will not be passed.*

## (c) PEACHES.

All varieties must, as far as possible, be shipped under their own names, and, where not so described, must be marked "Cape Freestone Peaches," with the exception that all early ripening varieties of similar appearance such as Hale's Early, High's Early Canada, Brigg's Red May, Waterloo, and Early Alexander may be classed as Alexanders.

Owing to deterioration in cold storage yellow-fleshed varieties other than Elberta *will not be passed.* Boxes containing Elberta peaches must be marked "Yellow Flesh" *on the end of the boxes,* under the name of the fruit.

Clingstone varieties and Mamie Ross *will not be passed.*

| VARIETY. | GRADES. "*Extra Selected*" (*diameter*). | "*Selected*" (*diameter*). | "*Graded*" (*diameter*). |
|---|---|---|---|
| Elberta ... ... | 2¾ in. | 2½ in. | — |
| Early Rivers ... ... | 2¾ " | 2½ " | — |
| All other varieties ... | 2½ " | 2¼ " | 2 in. |

The export of any peaches of "graded" size in large quantities at the present time is deprecated.

## (d) NECTARINES.

| VARIETY. | GRADES. "*Extra Selected*" (*diameter*). | "*Selected*" (*diameter*). | "*Graded*" (*diameter*). |
|---|---|---|---|
| All varieties ... ... | 2¼ in. | 2⅛ in. | 1⅞ in. |

Clingstone varieties *will not be passed.*

The export of any nectarines of "graded" size in large quantities at the present time is deprecated.

### (e) APRICOTS.

All varieties must as far as possible be shipped under their own names, and, where not so described, must be marked "Cape Apricots."

| VARIETY. | GRADES. "*Extra Selected*" (*diameter*). | "*Selected*" (*diameter*). | "*Graded*" (*diameter*). |
|---|---|---|---|
| All varieties except Early Cape | $2\frac{1}{8}$ in. | 2 in. | $1\frac{7}{8}$ in. |
| Early Cape varieties... | 2 ,, | $1\frac{7}{8}$ ,, | $1\frac{3}{4}$ ,, |

### (f) PLUMS (*Japanese*).

| VARIETY. | GRADES. "*Extra Selected*" (*diameter*). | "*Selected*" (*diameter*). | "*Graded*" (*diameter*). |
|---|---|---|---|
| Satsuma ... ... | $2\frac{1}{4}$ in. | 2 in. | $1\frac{3}{4}$ in. |
| Kelsey... ... ... | $2\frac{1}{2}$ ,, | $2\frac{1}{4}$ ,, | 2 ,, |
| Wickson ... ... | $2\frac{3}{8}$ ,, | $2\frac{1}{8}$ ,, | $1\frac{7}{8}$ ,, |
| Apple ... ... ... | $2\frac{1}{4}$ ,, | 2 ,, | $1\frac{3}{4}$ ,, |
| Sultan... ... ... | $2\frac{1}{4}$ ,, | 2 ,, | $1\frac{3}{4}$ ,, |
| Simoni ... ... | $2\frac{1}{2}$ ,, | $2\frac{1}{8}$ ,, | $1\frac{7}{8}$ ,, |
| Chalcot ... ... | $2\frac{1}{4}$ ,, | 2 ,, | $1\frac{7}{8}$ ,, |
| Burbank ... ... | — | $2\frac{1}{8}$ ,, | — |

Ogon, Shiro, S'momo, and Botan varieties *will not be passed.*

### PLUMS (*varieties other than Japanese*).

| VARIETY. | GRADES. "*Extra Selected*" (*diameter*). | "*Selected*" (*diameter*). | "*Graded*" (*diameter*). |
|---|---|---|---|
| All varieties ... ... | $1\frac{1}{2}$ in. | $1\frac{3}{8}$ in. | $1\frac{1}{4}$ in. |

### (g) GRAPES.

The undermentioned varieties are considered the most suitable for export in the order named:—

Red Hanepoot.
Barbarossa.
Raisin Blanc.
White Hanepoot.
Hermitage.
Golden Queen.
Lady Down Seedling.
Waltham Cross.
Gros Colman.
Flame Tokay.
Black Hamburg.
Gros Maroc.

The varieties known as White French, Muscatel, Black Prince, and Crystal *will not be passed.*

Other varieties will, however, be eligible for the Government brand. All varieties must be in good condition, the bunches of satisfactory size and trimmed and cleaned, and the berries of reasonable uniform size.

Grapes which have been properly trimmed and thinned can be marked "selected" on the end of the box.

After the 1914 season any term other than "selected" may not be used to describe the quality of the grapes.

The net weight of the fruit, after allowing 5 per cent. for shrinkage, and the variety should be marked on the end of each box.

It is recommended that grapes be cut and kept at least twenty-four hours before packing.

### (h) PINEAPPLES.

| VARIETY. | GRADES. | |
|---|---|---|
| | "*Extra Selected.*" | "*Selected.*" |
| Queen ... ... | 1½ lb. | 1¼ lb. |
| Cayenne ... ... | 5 ,, | 2½ ,, |

Pines of less weight than the "selected" grade in the respective varieties *will not be passed.*

At least one inch of stalk must be kept on the Cayenne Pine, and one-half inch on the Queen. The whole crown must be left on the fruit in as perfect condition as possible.

### (i) MANGOES.

All varieties will be accepted for inspection, but the peach variety is specially recommended.

### (j) CITRUS FRUIT.

*Oranges.*—These must be packed in accordance with standard packs, the box of 26 by 12½ by 12½ inches (outside measurement) being marked as containing 96, 112, 126, 150, 176, 200, 226, or 252 oranges, as the case may be. Single layer boxes must be marked with the variety and number of their contents.

It is recommended that thin-skinned oranges be packed separately from rough or thick-skinned ones and that boxes containing only thin-skinned oranges be marked "thin skin" on the one end thereof.

*Naartjes.*—The minimum size naartje to be exported is 1½ inch in diameter.

Loose-skin and green-skin naartjes *will not be passed.*

### (k) MELONS.

Up to the present the only variety that can be recommended for export is that known as the Winter Melon. Other varieties will, however, be received for inspection.

18. Fruit marked as "extra selected" or "selected" and found on inspection to be of a standard falling below those grades respectively, will be degraded, and, if complying with the other conditions, passed by the inspector.

19. Five per cent. of the boxes in each consignment will be opened for inspection and all boxes so opened will be stamped by the inspector to that effect.

20. In case any variety of fruit not specified in condition *seventeen* be offered for inspection, it will be left to the discretion of the inspector whether such fruit shall be branded as passed by him.

21. Only new and clean wood packages will be accepted for shipment.

# The Wheat Louse (*Toxoptera graminum*).

By W. Moore, B.A., Lecturer in Entomology and Zoology, School of Agriculture, Potchefstroom.

(*Continued from page* 772.)

### Syrphid or Hover Flies.

Another important predaceous enemy of the wheat louse is the syrphid fly. There are several different species, the larvae of which feed upon the wheat louse, but the most important is *Xanthogramma scutellare*. This fly is about $\frac{3}{8}$ of an inch in length; the face is yellow, the eyes brown; the thorax shiny dark brown or black marked on each "shoulder" with yellow; the abdomen black banded with several yellow bands, the first of which is interrupted at the middle. The male has the tip of the abdomen reddish brown.

The syrphid fly is very swift on the wing, and may often be seen hovering about plants infested with aphis or around blossoms, upon the nectar or pollen of which the adult flies feed. The eggs are white in colour, oval in shape, and laid one at a time among a cluster of plant lice. The egg hatches in about three days, and the larva or maggot feeds upon the lice. Its mouth parts are adapted for spearing its prey and sucking the juices out of its body. Often one may be seen standing upright on the leaf of a plant with the louse speared on its mouth parts, busily engaged in sucking out the juices, the dried body being allowed to drop to the ground. The larva are light green in colour, shiny, and wedge-shaped, the pointed end of the wedge being the head end. When full-grown, the larva is about $\frac{3}{8}$ of an inch in length. The larval stage lasts about ten days, during which time the average number of aphis destroyed is 386 or 38.6 lice per day. The value of the fly larvae is, therefore, equal to that of the larvae of the ladybird.

The pupa is irregular oval in shape, and fastened by one end to the leaf or stem of the plant. In some cases the larvae were noticed to enter the ground, and the pupa was found in the ground. The pupal stage lasts about eight to twelve days, when the adults emerge. Unlike the ladybirds, the adults do not feed upon the plant lice, so that in this insect only the larval stage is beneficial in destroying the wheat lice. The syrphid flies would not lay eggs in captivity, so no exact data can be given as to the number of eggs laid by one fly, but from an examination of the ovaries of the female fly it would seem that about 100 eggs were laid during its lifetime. The syrphid fly feeds upon almost any aphis or plant louse, and is often a very important control of the rose aphis, of which the ladybirds do not seem to be so fond.

### The Lace Wing Fly (*Chrysopa* sp.).

The larva of the lace wing, or as it is sometimes called "golden eyes" or "aphis lion," is sometimes found feeding upon the wheat louse. The adult insect is of a pale green colour with bright yellow

eyes. The wings, four in number, are covered by a network of veins, and are folded roof-like over the abdomen when at rest. The insect is from ⅓ to ⅝ of an inch in length. The egg is laid on the top of a long slender stalk. Some species lay their eggs clustered, each egg on its individual stalk, but the species found here most commonly lays its egg singly. The reason for laying the eggs on stalks seems to be to protect the unhatched eggs from being eaten by the other larva. In about a week the egg hatches and the active larva makes its way down the stalk and seeks out its food. It has a slender body set with spines, and a pair of long curved "hollow" mandibles. It catches the aphis in its "hollow" mandibles (not really hollow, but the mandibles and maxillae are so arranged that there is a hollow groove between them) and sucks out the juice. The empty dried skin is not dropped to the ground but placed on the back of the larva where it is held by the spines. This continues throughout the life of the larva, a mass of dried skins accumulating until the larva is practically hidden underneath them. When full-grown the larva spins a little cocoon in which it pupates. The pupal stage lasts about one month.

The lace wing has only rarely been seen feeding upon the wheat louse, and therefore cannot be considered an important control, but where the larva is found it does very good work, destroying a large number of lice per day. This insect is frequently found upon the yellow aphis on wild cotton, and also on the rose aphis.

### PARASITES OF THE ENEMIES OF THE WHEAT LOUSE.

Although the ladybirds and the syrphid fly do very good work in destroying the wheat louse, they themselves are prevented from becoming too numerous, and probably entirely destroying the wheat louse, by parasites which destroy the ladybirds and the syrphid flies. There are three distinct parasites which have been found to destroy these insects. These parasites are small wasps, which lay their eggs inside the larvae of the beneficial insects, and by the development of the grub which hatches from these eggs the value of the beneficial insect is decreased until finally it dies, generally without being able to reproduce. The numbers of the ladybirds and syrphid flies are thus materially decreased.

### THE BRACONID PARASITE (*Dinocampus* sp.).

The braconid wasp (*Dinocampus* sp.) is about ¼—or a little less—of an inch in length, black in colour, with the head, front legs, and tip of the abdomen yellow. On the under side and just back from the tip of the abdomen there is a sharp ovipositor about 1-16th of an inch in length. The ovipositor is the organ which is used to insert the egg inside of the body of the ladybird larva. This wasp is a parasite on the black-spotted and the red-spotted ladybirds. The adult wasp lays her egg inside the body of the larva of the ladybird, and probably in some cases the pupa. The grub which hatches from this egg does not reach its full development until after the ladybird has reached the adult stage. The first evidence of the parasite in the adult ladybird is shown by the restless behaviour of the ladybird. It wanders about, does not feed, becomes sluggish in its movements, and finally dies. The full-grown larva of the parasite then emerges from the body of the ladybird and spins a light silken cocoon directly underneath the dead body of the ladybird. This cocoon soon becomes darker in colour, and in about ten days' time the adult parasite emerges.

The braconid parasite did not seem inclined to breed in captivity, but after several attempts two were induced to lay in the larva of the red-spotted ladybird. Unfortunately there were only four larvae in the cage, and these were so badly "stung" that, although they reached the pupa stage there was no further development, and both ladybird and parasite died. The fourth seems not to have been stung. In another case the parasite was placed in a breeding cage with a number of larvae of the black-spotted ladybird which were just at the point of pupating. Four of these were "stung," and although the parasite was observed "stinging" one of the larva, it is possible that in some of the other cases of the ladybirds which later developed the parasite the parasite had stung the pupa rather than the larva. From this latter experiment it was found that the larval stage of the parasite was about fourteen days, which makes the period from egg to adult about twenty-four days.

The number of eggs which the braconid wasp is able to lay was not determined. They seem to lay only one egg in each ladybird, but if the ladybirds are few probably more will be laid but only one would develop. Ladybirds collected in the field either as larva or adults will often show as high a percentage as 25 per cent. to 50 per cent. parasitized by this wasp. The adult ladybird which contains a parasite does not, as far as observed in the experiment, lay eggs. One peculiarity of the braconid wasp is the fact that they all appear to be females. Of all the specimens bred out in the insectary during the year no males were found.

Even when the female which was unfertilized laid eggs in captivity the offspring were females, not males as one would expect from a comparison of the parasite of the wheat louse (*Aphidius*).

The braconid wasp was bred from ladybirds collected both at Potchefstroom and in the Orange River Colony. It seems to prefer the black-spotted ladybird, and has not been bred from the black ladybird, nor could it be bred into the black ladybird. There seemed to be a decided reduction in the number of black-spotted ladybirds found in the field during the past summer. The greatest number were found in the spring and autumn, being abundant until December, and again becoming abundant in March. This falling off may be due to the abundance of the parasites and to the fact that the cold affects the development of the parasite more than it does the ladybird, while heat is more beneficial to the parasite.

### THE CHALCID WASP (*Homalotylus* sp.).

The chalcid wasp is a much smaller species than the previous parasite, being only about 3-16ths of an inch in length. It appears black in colour, but is really a very dark green. The tip of the elbowed antennae is white, as is also the tarsi and the spur of the tibia of the second or middle pair of legs. The wings have a dark blackish or brownish band across the middle.

This parasite was originally bred from the larvae of the black ladybird collected in the field during October. There seemed to be about 25 per cent. of the larvae parasitized. The chalcid wasp breeds readily in captivity, and full data was obtained. The little parasite walks up on the back of the ladybird larva and examines it carefully with its antennae. It then bends its abdomen down and punctures or "stings" the larva with its ovipositor, laying from three to seven eggs (the average number is four) inside of its body. These eggs hatch

and the larva develops within the body of the ladybird larva. In about four to six days the larva of the ladybird assumes a position such as it does when about to pupate, but instead of pupating it dies and turns black. This is probably the day on which the larva of the chalcid wasp becomes full grown and pupates. In another nine days the adult parasites emerge from the body of the dead ladybird larva. The chalcid parasite therefore only requires about sixteen days to complete its cycle as compared with the twenty-four days of the previous parasite. The number of eggs laid by the chalcid was not determined. Which of the two parasites is the more destructive to the ladybird would be a question, for although the chalcid has a shorter life cycle than the braconid each egg laid by a braconid destroys a ladybird, while it is only every three or seven eggs laid by the chalcid that destroys a ladybird.

The chalcid wasp will also breed in the larvae of the black-spotted ladybird, the red-spotted ladybird, and the orange-spotted ladybird, but it prefers the larvae of the black ladybird and the orange-spotted ladybird. Of the ladybird larvae collected in the field, the chalcid was only bred from the black ladybird and the orange-spotted ladybird larvae, and never from either the black-spotted or red-spotted ladybird. It was never bred from either the pupa or the adult stage. In one experiment the chalcid parasites were placed in a breeding cage with both black-spotted ladybird larva and black ladybird larva; eight of the black-spotted and one of the black ladybird. The parasite in this case "stung" both, but showed a preference for the black ladybird larva. When it climbed up on the back of the larva of the black-spotted ladybird the larva squirmed so much that in some cases the parasite was dislodged. This was not the case with the larva of the black ladybird, which did not seem to mind its presence much until the parasite pricked it with its ovipositor.

An attempt was made to breed the chalcid parasite in the larva of one of the injurious ladybirds, which, if successful, would have shown the chalcid to be a beneficial insect as well as an injurious insect. Specimens of the melon vine ladybird (*Epilachna chrysomelina*) were collected and fed on melon leaves. Eggs were obtained and the larva raised in such a manner as to be free from all parasites. When about half grown several specimens of the chalcid wasp were liberated with them. Although the parasites walked all over the larvae of the ladybirds they were never seen to "sting" them, and the larvae were raised to their full size and finally pupated. One of the pupa turned very dark, but all emerged as adults and were kept for some time, but never showed any signs of having been parasitized.

### ICHNEUMON WASP (*Bassus laetatorius*).

The syrphid fly has also a parasite in the form of an ichneumon wasp, a species world wide in its distribution. This little parasite is a little over $\frac{1}{4}$ of an inch in length. The head, thorax, the base and the tip of the abdomen black; the middle portion of the abdomen and the two legs, except the tibia of the hind pair of legs, light brown or reddish brown. The tibia of the hind pair of legs has the basal portion black, then a white ring, and then a ring of black, the distal portion being reddish brown like the rest of the legs.

This parasite is frequently to be found upon plants which are infested with aphidides. They walk about over the plant seeking for the larvae of the syrphid fly (*Xanthogramma scutellare*). When it

finds a larva it lays one egg inside its body. This egg develops into a larva or grub which feeds inside the body of the syrphid fly larva. The larva of the syrphid fly finally pupates and then dies, after which the larva of the ichneumon pupates inside the puparium of the syrphid fly. In about fifteen days from the time that the egg is laid the adult ichneumon wasp emerges.

The ichneumon wasp appears to be a very effective control of the syrphid fly. From the examination of the ovaries of one of the parasites it was found to contain upwards of 200 eggs, which is about twice the number of eggs found in the ovaries of a syrphid fly. The period from egg to adult is also shorter for the parasite than for the syrphid fly. There are several periods during the summer when the syrphid flies become very scarce in the field, and this scarcity cannot be accounted for by the syrphids, all being in the pupal stage at one time, since one can find eggs and full-grown larva of the syrphid on the plant at the same time, in which case the full-grown larvae would reach the adult stage about the same time as the eggs would have hatched and the larvae from them become full grown.

It is thus seen that under normal conditions the generations overlap, and syrphid flies could be found at all times. These periods must therefore be caused by the attacks of the parasites. One generally finds the aphis abundant, then the syrphid flies become abundant, and the aphis decreasing in numbers. The parasite then becomes abundant and the syrphids are reduced, with the result that the aphis decreases in numbers. The parasites when too abundant die without being able to lay their eggs in syrphid flies, there not being sufficient syrphid flies present. With the decrease of the parasites the syrphids again have an opportunity to increase in number and reduce the aphis. Thus the battle continues, and one can easily watch it with the rose aphis, the main control of which is the syrphid flies. One will succeed the other in their abundance throughout the summer, and the result of the success of the syrphid will be the success or failure of the rose.

(*To be continued.*)

# Fruit Stocks and Scions.

By W. A. Sturm, Lecturer in Horticulture, School of Agriculture, Potchefstroom.

Many readers will be thoroughly familiar with the meaning of the terms "stocks" and "scions"; to those who are not I will briefly explain. The great majority of our cultivated fruits do not produce true to type from seeds: they must therefore be propagated by an asexual progress—either by budding, grafting, by means of cuttings, layers, etc. For the purpose of this article we have only to consider the operations of budding and grafting.

"Stocks" are trees, whether produced from seeds or cuttings, into which either buds or scions of the variety we desire to propagate are inserted.

"Scions," strictly speaking, are short pieces of wood possessing two or more buds, which are inserted into the stocks and from which the future tree is produced. The same result is obtained by inserting a single bud into a stock. For the propagation of a definite variety it is immaterial whether budding or grafting is resorted to; therefore we are justified in calling the tree that is produced the "scion."

The stocks through their root system take up from the soil nutriment which is carried upwards and is elaborated by the action of the leaves and utilized for the formation of new tissues, leaves, branches, and fruits on the scions and roots of the stocks.

The stock acts in a sense as a foster-mother of the scion, but not entirely so, as the leaves of the scion have to perform the elaboration of the sap. By the union of the stock and the scion we have apparently created a homogenous individual tree, but this is not so; the stock and the scion retain their original individuality subject to certain influences which will be considered later.

Should any growth appear below the union of the stock and the scion, this growth will be of the original characteristic of the stock. For example, if a peach has been grafted on an almond stock, any growth springing from this stock below the union with the peach will be almond; therefore we must infer that the power to produce certain forms is inherent in the cell plasm, as neither does the sap supplied by the stock—almond in this case—produce almond growth in the peach scion, nor does the sap elaborated by the peach produce peach growth in the almond stock.

The above seems to prove conclusively that there is no alternating influence between stock and scion. The stock nourishes the scion by supplying nutriment in the crude form, the scion elaborating the sap and nourishing the stock, each retaining its individuality.

Practical experience has proved that stock and scions relatively influence each other. The greatest observable influence is on the longevity of the trees. The greater the structural similarity between the stock and the scion the stronger will be the union.

All our stone fruits, peaches, nectarines, apricots, domestic and Japanese plums and almonds can be inter-budded or grafted, but the strength of the union is greatly affected by the structural affinity.

Peaches and almonds form a strong union, while the union between apricots and almonds is weak, and trees so produced are apt to be broken off at the place of union. Some domestic plums unite well with almonds, others do not, and the same holds good with Japanese plums.

Apples can be worked on pear stocks and vice versa, but the union does not last long and the growth is unsatisfactory.

A naturally long-lived stock will confer this characteristic on the scion worked on it, provided the structural similarity is sufficient; and a long-lived scion will do the same to the stock on which it is worked, all within certain limits.

The habit of growth is also greatly influenced. A scion of a weak-growing variety, worked on a vigorous-working stock, will be thrown into stronger growth than is natural to it; again, the weaker growth of the scion will have the effect of somewhat retarding the growth of the stock.

This fact is made use of to produce dwarf trees, for instance, working apples on Paradise apple stocks or pear on quince stock.

Unforeseen results are often obtained by working a weak-growing scion on a vigorous stock. For the first few years the growth of the scion may be very vigorous, then coming suddenly to almost a standstill.

Where the dissimilarity between the growth of the stock and the scion is great, we have often found that the vigorous-growing stock has expanded more than the weaker-growing scion, so that the trunk of the tree below the union is considerably thicker than above the union, and, vice versa.

In some instances the relative influence of growth between stock and scion is so great as to equalize their growth. I have recently observed, at the Government Experimental Orchard at Warmbaths, oranges worked on *Citrus trifoliata* stock. This stock is of a far less vigorous growth than the oranges worked on it, and one would naturally expect that it would exercise a dwarfing influence on the orange scion. Apparently in this case it has not done so, neither is the size of the trunk of the stock below union smaller than the orange scion. Here it seems that the orange scion has infused its vigour into the weaker stock. Whether this influence will be maintained is a matter of observation.

It is also assumed that the stock influences the scion as to its resistance to adverse climatic conditions. That is to say, it is believed by some growers that a frost-resisting stock will confer a certain amount of its resistance to the scion grown on it. A certain influence is shown as to the period of the commencement of growth. It is a well-observed fact that all trees do not start into activity at the same time; even varieties of the same class differ materially. Therefore, by working a late variety on an early stock, the scion is thrown into growth earlier than if it were worked on a stock which starts into growth late, and by working an early variety on a late stock its growth is retarded.

This is of practical value to the grower who aims at the production of early fruit, or to a grower residing in a district subject to late frosts where it is advisable to restrain activity to a later period in order to escape damage from frosts. This influence is subject to local condition; while in some localities it is barely felt, it is very pronounced in others.

We now come to a very important and disputable point: the influence of stock on the quality of the fruit of the scion. Habit of growth is certainly affected by the stock, therefore it is reasonable to assume that the size of the fruit is also affected, and in many instances this is so. Many growers assert that the stock also materially influences the flavour of the fruit. Peaches grown on almond do not possess the fine aroma as those grown on peach stocks. Many varieties of pears are better flavoured when grown on quince stock than on pear stock.

Opinion amongst orange growers differs greatly as to the influence of the stock. Many maintain that the use of the rough lemon stock has a deteriorating influence on the quality of the oranges grown on this stock. Recent trials at the Government Experimental Orchard, Warmbaths, seem to show that this is not the case. Oranges grown on lemon stock and sweet seedling orange stock have been analysed, with the result that their chemical constituents were almost equal to those grown on sweet seedling stock, possessing a trifle more sugar and acid.

My own experience has been that the use of the lemon stock has a tendency to increase acidity and promote the formation of a thicker rind, especially when the trees are young; at a greater age the difference is hardly perceptible.

Different climatic and soil conditions undoubtedly exercise some influence.

The rough lemon, being a very vigorous grower and strong feeder, is certainly greatly favoured, and, in my opinion, is quite suitable as a citrus stock, provided buds are taken from trees which produce the best quality of fruit—preferably grown on sweet seedling stock. If the lemon stock has any deteriorating influence, however slight, and while this influence may be almost overcome in the first generation, a continuous propagation from trees grown on lemon stock to lemon stocks and so forth for a great length of time must increase the deteriorating influence.

If my theory is correct in the case of oranges, it must also hold good with other classes of fruits.

Unfortunately the lifetime of a man is not long enough to bring experiments of this class to a definite conclusion, and many factors enter which greatly influence results which, if not carefully noted, may lead to wrong conclusions, such as the selection of buds used for propagation.

It is a very obscure point whether the stock has any influence on the seed produced by the scion. Daniels, a French investigator, proved to his own satisfaction that the seeds of herbs which are grafted on wild stock had a tendency to revert to the original type.

The great pomologist, Van Mons, inserted buds of the wild pears of Europe, which bear very inferior fruits, into quince stock and sowed the seed produced by the scion (the wild pear). From the seedlings thus obtained he took buds again and inserted them into quince stock, and carried on the experiment for a number of years. No observable influence was perceivable for many years, but eventually he produced pears of great excellence, such as the Beurre Diel, for instance. He ascribed the eventual success to the influence of the quince stock.

If his deduction is right, and I am personally convinced that he is right, if the stock can beneficially influence the seed of the scion,

then it follows as a logical conclusion that the stock can also adversely influence the fruit of the scion, as in the case of oranges grafted or budded on rough lemon stock.

As I stated before, the influence, whether beneficial or the reverse, may not manifest itself prominently in the first or for many generations, but this influence is cumulative until its effects become prominent.

I will leave this subject here as I propose to write on it in my next article on fruit tree breeding.

One distinct influence of the scion on the stock is shown by the transmission of the alteration of the chlorophyl of the leaves. I have conducted numerous experiments by grafting scions of plants with variegated leaves on stocks of the green-leaved variety or species, and, after the union had been effected some considerable time, forced the stock to produce growth below the place of union, and have been in many instances rewarded by the production of shoots from the stocks with variegated leaves.

We will now consider the practical application of the foregoing.

The practical fruit grower will naturally inquire what is the best stock to use. This can only receive a qualified reply. The stock best adapted to local condition. While it is justifiable to recommend certain stocks for general use, allowances must be made for varying conditions.

Experience has proved that the common yellow Transvaal peach is an excellent stock for all stone fruits with rare exceptions.

Pears have so far proved more successful on pear seedlings than on quince stocks, although I believe that under certain conditions, quince of the right sort will prove suitable.

Apples have to be worked on blight-proof apple stocks to enable us to cope with woolly aphis.

The consideration of the merits of different stocks for special conditions I will leave for a future article.

# The Veld-burning Question.

## SOME MORE READERS' OPINIONS.

SINCE we first broached the subject of veld burning and its effects in our April issue the question has aroused widespread interest, and we have received and published a number of letters on the subject from readers. During the past two months quite a batch of correspondence has been received, to which we give publicity below. It will be seen that the question is approached from various points of view, and that therefore the practice is both supported and condemned according to readers' individual experience.

### DISTRIBUTION OF SWEET AND SOUR VELD.

To the EDITOR of the *Agricultural Journal.*

Sir,—I have read with interest the letters published in the August issue of the *Agricultural Journal*, and your own comments thereon appearing in the September issue, bearing on the subject of grass burning.

By reference to my previous letter on the subject you will notice that I favour burning dry grass off the land during the spring months, and that I am strongly opposed to any subsequent burning, viz., during the summer, autumn, and winter months.

Your correspondents are opposed to burning at any time, and you are inclined to favour their policy. The question remains who is right? The evidence of your non-burning correspondents is not sufficiently convincing to prove their policy to be the right one. I do not wish to condemn the opposition, but for the sake of a clearer and more convincing argument I propose to criticise some of the statements made.

Mr. C. R. Prances has a rough mountain farm where mowing is impossible, close grazing not easy, and growing mostly coarse sour grass. You are inclined to think the coarse, sour nature of Mr. Prances' grass has been brought about by burning. How do you reconcile the contrast with my short, fine, sweet grass which is burnt annually immediately after the first spring rains?

Does it not occur to you that the naturally loose nature of the earth of the mountains of this country, moisture caused by clouds, and mist capping the mountains, higher altitude, snowfall, and absence of frost (as compared with the low country) are the chief factors causing the natural difference in the veld?

A general comparison of the earth and the grasses, etc., shows us the coast-belt comprising a loose friable earth subject to more moisture from the sea and overgrown with a rank growth of grass, which from appearances would be most unsuitable for grazing to

stock—if it should chance to come under the drier and frosty conditions further inland. If we consider the conditions further inland, by taking a parallel line from the top of Giant's Castle across Natal to Qudeni, in Zululand, we find everything has completely changed from the coast conditions. We also find a complete contrast between the lowest point on this imaginary line and the highest. Taking the banks of the Tugela River as the lowest point, here we find only such hardy dwarfs as mimosa, celoe, euphorbia, and a growth of grass which is anything but luxuriant, yet sweet and of better feeding value than higher up on the line. This is evident from the excellent condition of stock owned by natives resident there, and the prime condition of all classes of stock sent from the highlands to winter in this thorn country. On a higher altitude we find the mimosa and other drought-resisting dwarfs have disappeared. Here we find yellow-wood and other timber trees adorning the southern slopes of the hills, and the earth not quite so hard as the thorn country—and well covered with a short, sweet veld, but not so suitable for winter grazing as the thorn veld. The rainfall is slightly more, and the temperature considerably cooler with severe frosts during the winter.

We now arrive at the other point of the line, the mountain. Here the trees are mostly sugar bush, and the veld or grass is coarse and sour, the earth loose and damp, and very much less dependent upon rain to start the grass growing in the early spring. The rainfall is slightly more. Except for spring and grazing, the grass is much inferior to the lower levels for general grazing.

Having noted the varying conditions of earth, grass and tree growth, and climate (temperature and rainfall), and as we have no evidence to prove the present conditions to have been otherwise than they were a thousand years ago, and further no evidence to prove that during the past thousand years it has not been annually burnt, how are we to believe that the coarse, rank growth of the coastal area and coarse, sour growth of the mountain area have been brought about by burning, when the low inlands have sweet, fine veld subjected to the same treatment as regards burning?

To put the matter into a nutshell, we have the humid warm coast, the humid cold mountain, the dry warm thorn, and moderately dry and cool midland atmosphere, with a corresponding difference in the nature of the earth.

These are the causes of the difference between sour and sweet veld on a broad principle. They are applicable, in a narrow sense, equally as much where the veld falls from 6000 feet to perhaps half (or less) this elevation on the same or adjoining farms.

We can also notice a decided difference in the condition of the veld by viewing the northern and southern aspect of the hills.

The northern, which is the drier side of our hills, grows a shorter and sweeter grass, with an opposite tendency on the southern slopes.

Mr. Prances has missed the point where he refers to the objectionable seeds of steek grass. It is not intended to burn the grass to destroy the seeds, but grass which has been burnt off in the spring will seed much less than grass which has not been burnt—that is, not burnt the first year.

His reference to a strip of ground remaining barren for years after a tree has been burnt on it causes me to wonder if he has seen a wattle plantation after the timber and branches have been burnt

on the land. Judging by the dense growth of young wattles and their very healthy appearance, I should think the ground is anything but barren. At the same time there is some difference between burning grass a few inches tall and trees many yards high.

The game query does not explain the burning question of fifty years ago as being anything different to the present day.

Mr. Prances has made a rather serious slip against his own argument in favour of humus when he refers to the dew lodging on the old grass and being evaporated without doing the roots any good.

I am not quite clear as to what Mr. Prances means when he refers to the "sad stuff" growing in the burnt-off paddocks round his house. Has the grass changed its nature or is it still the original coarse, sour grass that he refers to in the first part of his letter? My experience of house-paddocks leads me to suppose that Mr. Prances burns this grass at the severest time of the year, early winter.

Until these points are clear we cannot consider this paddock in the argument. On the question of erosion Mr. Prances makes rather a bad case for non-burning. He has had his farm four years, and four inches of his ground surface has washed or been blown away during that time. At this rate of surface disappearance he will soon have no land left on which to grow grass, either sweet or sour.

Your own statement that delicate plants require at the very least natural conditions to enable them to survive and prosper induces me to draw your attention to the indisputable fact that Nature owes much of its improvement to the artificial practices of civilized man. Evidence is everywhere before you.

If I adopted the unnatural practice of ploughing in my indigenous veld, thoroughly pulverized the soil, adding some suitable fertilizer, and then sowed the whole with indigenous grass seeds, I should have a stand of grass which for quantity and quality would be far superior to the unbroken veld. What, then, would be the value of unnatural conditions compared to natural?

The hardening of the surface of the ground is caused for the most part by the trampling of stock. Turn a herd of cattle into a field of mealie stalks and you find the ground trampled as hard as a brick. If this hardening of the soil surface is due to a few months' trampling can we expect the soil of the veld to be less than hard after being trampled from the beginning of the world? Intensive grazing would not only be the cause of extensive trampling, but the ground would be exposed more to the drying influence of the sun and winds during the months previous to the spring rains. Therefore burning and grazing can go into the same bracket in so far as they effect erosion of the veld.

Your suggestion of the influence caused by shock to the grass as the result of burning is not a feasible one. The grass being dry and dead, is not subject to shock, even if we are to suppose it otherwise would be. I do not think sugar-cane growers would fire their sugar-cane fields previous to cutting if the plants are subject to shock sufficient to injuriously affect the growth or quality of the cane. The singeing of one's hair is recommended for its stronger growth!

I fully agree with you that mowing is, or should be, the proper method of dealing with our superfluous grass, but unfortunately this is not practicable owing to many causes apart altogether from the cost and labour necessary.

Mr. J. J. Claase's theory that burning the veld is the cause of disease in stock reminds me that theory is a poor horse unless driven with practice. Science and practice have proved all our one-time diseases of the veld to be caused, not by the veld, but by such innocent looking creatures as ticks, mosquitos, etc. And the very many theories respecting the cause and cure of gal-lamziekte are up to the present all of the same value—since they prove nothing they are worth nothing.—I am, etc.,

CHAS. R. SKOTTOWE.

Mooi River, Natal.

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## ANOTHER NATAL VIEW OF BURNING.

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To the EDITOR of the *Agricultural Journal.*

Sir,—This is a subject on which much may be said both for and against. I have had forty years' experience in grass burning in Natal. While it is true that burning destroys valuable humus and mulch, it also destroys much useless weeds and shrubs, many of them of a perennial nature, as well as vermin, snakes, ticks, etc., by removing the cover. Grass fires are a serious consideration too, as the clean sweep made at Cedara a year or two ago—and the many yearly calamitous fires in many places—testify. This is a red grass district, and the burning does not apparently affect the stand of grass, which is very thick and good. You speak of thoroughly grazing down the veld instead of burning it, but this would be fatal, over-grazing being much more detrimental than burning, as the grass has no chance to produce seed. Although we spray regularly, any old pieces of grass left are sure to be infested with ticks in the spring, so are burnt then. Burning does not injure the red grass seed, as it can be seen after the rains coming up thickly everywhere. The soil here is decomposed traps, slates, and sandstones, deficient in lime, but otherwise good. Its staying power is marvellous, for paddocks that have been grazed for forty or fifty years and never manured, except by the droppings of the cattle, still bear thick crops of red grass, and cattle keep well and milk well on it. We commence burning breaks and patches as soon as the grass will burn clean, gradually burning all off. The great evil is not burning, but over-stocking, especially with sheep, and the want of a plentiful supply of hay made from cultivated grasses and clovers that have been manured with phosphates, so that the cattle droppings are rich in this vital necessity.

With regard to the evil of scouring, this is not noticeable to any great extent, but around Estcourt and Weenen, where the soil lies on a slate bottom, very great harm is done in places, the fall of water acting like the gold hydraulic plant, which can move thousands of cubic yards of earth a day. The only cure is rough stone dams, so that the storm falls on stone, not soft earth.—Yours, etc.,

"OBSERVER."

Sweetwaters, Natal.

## EROSION AND LOSS OF FERTILIZING MATERIAL.

To the EDITOR of the *Agricultural Journal.*

SIR,—I have read with great pleasure the discussions on veld-burning and erosion. I fully agree with what has been written in the September *Journal* by Messrs. Prances and Claase. I do believe that burning grass not only causes sickness in stock but is detrimental in every respect. It causes sluits and makes the veld hard and sour. That of itself brings on in winter what is commonly kown as "losse tanden," loose teeth among cattle; and also redwater is suspected to come from untimely burnt grass. By burning veld you burn all the manure, such as dung, old grass, which is very usefully covered with silt when rain comes, and in such a way serves to fertilize and bring soft and sweet grasses.

A few farmers in these parts have experimented in allowing their veld to grow rugged in summer and then burn it in spring, and I can assure you their grass is plentiful but their stock is getting scarce on the farm. We have an old saying that lots of grass on a farm means few head of stock to the owner. This has been proved in these parts where the veld is not eaten down in winter. Stock will not do well all the year round. In my opinion grass burning ought to be stopped in more than one district in the Union.

Erosion may also be detrimental if overdone, but, no matter how the veld is eaten down, it is better than burning the grass. It leaves the droppings and urine of the stock as manure, whereas burning clears every particle of anything that might remain as such, and then there is the danger of sluits, which are easily caused through stock paths with nothing to stop the washing of sluits in a storm.

The evil of the whole thing in this country is, our farms are too large; if our farms were smaller we would not need to burn our grass, to the loss of farmer and country.—Yours, etc.,

W. MUIR.

Lady Frere.

## WHY BURNING SHOULD BE ABANDONED.

To the EDITOR of the *Agricultural Journal.*

SIR,—Kindly allow me to express a few thoughts about veld-burning. It is a subject on which many opinions exist, and it cannot be otherwise, seeing that the circumstances differ so in our country. I agree with those who are of opinion that grass-burning is injurious. and that, by continual burning, the earth is slowly but surely robbed of her natural moisture-saving covering. And the further apart the grass the easier flood-water runs over it and to the sea.

Small farms with stock should not be burned at all, or very little. In the summer months the grass is grazed very short, so that very little remains to be burned. It has, however, become customary with us farmers here in the north-east of the Orange Free State to burn from the 20th July. I acknowledge that it was necessary in the good old days when a farmer had 3000 to 20,000 or more morgen to

farm, and the neighbours were not so exact either. The grass grew so coarse and rank that it was impossible to farm with small stock, and consequently it became necessary to burn. In any part of the world where grass grows rank and coarse it is necessary to burn until such a part of the world is more or less civilized and the grass does not get a chance to grow rank. But to let grass which cannot be kept grazed down grow rank is only to keep it as a breeding place for ticks and other insects. These days are past for most farmers, and the time has come when other methods of farming must be adopted, whether one likes them or not. It is impossible for farmers possessing 500 to 2000 morgen of land, and farming with stock, to close their eyes and go on burning the veld year after year. I am convinced that grass burned every year in August or September decreases in value; it becomes coarse, and less liked by stock. Every farmer knows that stock prefer "brand" to old grass, a proof that it is better than that burned every year. There is a danger, however, that the veld will be cropped too closely. According to my opinion the farm should be cut up into camps, so that the grass can seed the one year in the one camp and the other year in another camp, and thus be able to propagate itself. If the grass is not allowed to seed, the veld will in time become bare. It is now the second year that as little veld-burning is done on my farm as possible, and the first winter I found my stock covered with ticks, a plague that will become much worse by not burning. "Steekgras" is also another plague. Farmers possessing large farms and who have not enough stock to keep the grass down will be obliged to burn it in summer, so that the grass will not seed too heavily. These summer burnings are the most injurious, because the good grasses are also destroyed.

Sir, if you consider my letter of interest, I will write later on again on this subject. I have occupied the same farm for fifty-one years and know all about the changes that have taken place during that time.—Yours, etc.,

M. J. BEUKES.

Welvaart, District Vrede, Orange Free State.

[We shall certainly be pleased to hear further from Mr. Beukes on this interesting subject.—EDITOR, *Agricultural Journal.*]

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To the EDITOR of the *Agricultural Journal.*

SIR,—I am not a writer, also not a man of politics, but in the September issue of the *Journal* I see so much written about grass-burning—whether it is good or not for the stock farmer—that I would like to give my own experience.

There are two kinds of veld, sour and sweet. In my opinion sweet veld should never be burned; it is the worst thing a farmer can do. The fire burns out the tender plants between the more hardy ones, and these never grow again. And instead of increasing the grass it is decreased, and the veld is tramped out very easily. What kind of a farm does a buyer look for—one with a thick growth of grass, or one with a thin growth of grass, hard veld or soft veld? The cause of both kinds is the burning of grass.

I would advise farmers never to burn. If the veld gets too rank get more stock, then you make it sweet and soft for any

kind of stock. Sour veld should also never be burned, because it gets still more sour and harder. Let your stock tramp it so that it can remain short, then it is very good veld for stock. All our farmers take refuge in sour veld in times of drought; therefore do not burn. Drought makes our veld thin enough, so that it is not necessary to burn too.—Yours, etc.,

J. H. VORSTER.

Biesjesbult, P.O. Barendskraal.

## SEEDING OF VELD GRASS.

To the EDITOR of the *Agricultural Journal.*

SIR,—Old grass cannot prevent the new from coming up. Soon after the rains start, the old grass rots away and goes to manure the new. Old grass checks soil erosion when the rains start. When heavy rain falls on a slope where the grass has been burnt off and the new growth has not started or is very short, serious erosion occurs. Spring burning would be too late to prevent seeding, though doubtless it would destroy any seeds lying on or close to the surface of the soil, but I do not think a good case has been made out against allowing veld grasses to seed. Prevention would mean that the grass would have to spring from the old roots, while seeding means tender new grass, and resowing of bare patches. Old grass, if left, would give shade and check evaporation, and so favour seed germination. When the grass seeds are ripe, flocks of small birds may be seen feeding on them, also fowls eat them; cattle eat off the heads or ears with relish. Such food must be very nutritious and too valuable to be burnt.

Some information is wanted regarding the natural life of veld grasses. May it not be that some are comparatively short-lived, and that, even if they withstand fire, they would certainly die out in time, unless permitted to propagate by seed? Where there is good growth a grass fire gives out great heat, and the effect of this on the fertile surface layer of the soil is worthy of consideration. As has been pointed out, a bonfire, or a burnt fallen tree, leaves bare patches, where nothing grows for long after—the fertility of the soil is destroyed. If grass fires have a similar effect, even in much lesser degree, it might account for much. This has also a bearing on the burning of heaps of weeds, mealie stalks, or other rubbish on the land.—Yours, etc.,

H. G. CAMERON.

Salamanga, Maputo,
Via Lourenco Marques.

## EFFECT OF BURNING.—AN EXAMPLE.

To the EDITOR of the *Agricultural Journal.*

SIR,—Herewith some of my experiences with burning of grass. I am fifty-seven years of age. I was born in the Cape Colony, and am a sheep farmer, or, rather, I do mixed farming—crops, cattle, horses,

and sheep. I have now been twenty-four years in the Transvaal and am still farming, therefore I ought to know something about it.

I have noticed that when sweet veld is burnt for two or three years it totally disappears, and one gets steekgras and shrubs in its place.

The more sour veld is burnt the worse it gets. The fire does not give the sweet grass a chance to grow, and the sour grass gets more sour.

I have been farming here now for six years. Adjoining my farm I have an unoccupied farm lying waste and uncultivated. I tried to acclimatize small stock here, but lost 70 per cent. Where I built my house is a strip of sour grass. On that strip I built my kraals. Next to them I have about one morgen, which I have cut, and the grass put in the kraals for manure. It is now four years that that spot has not been burnt. I notice a great difference already. When the stock are brought to the kraals they all go to that spot, and it does not matter whether it is cut short or not, they graze. Portions I am obliged to burn, because I have not got enough stock to graze it down.—Yours, etc.,

C. J. J. NAUDE.

P.O. Tzaneen.

## A CHALLENGE.

To the EDITOR of the *Agricultural Journal*.

SIR,—I noticed Messrs. Prances' and Claasse's letters in the August number of the *Agricultural Journal* and did not agree with their tenets, but having neither the time to enter into a paper controversy nor the ability to carry it through successfully, and, moreover, as argument is not going to settle the question one way or the other, I passed them over; but now that I see that you make capital of them in the September issue I think it time something was done.

You, Mr. Editor, being a learned man, must know that any country that is denuded of its vegetation dries up. You also know that this country is being denuded of its vegetation by over-stocking, and that it is drying up at a very rapid rate. And one of the reasons, if not the chief one, for this over-stocking is the incessant writing about the ill-effects of burning grass. The farmer says to himself, "I cannot burn the grass without spoiling my farm and my sheep will not thrive on long grass, so the only course open to me is to stock my farm so heavily that the grass will be kept short"; and he forthwith stocks it in this manner, with the result that in the course of a few years half of it has no grass at all on it, and it washes into sluits.

Now, as I have already stated, argument is useless. What is wanted is proof of whether burning grass does injure it or not. And if any of the gentlemen who consider burning grass to be injurious will take me up, this is what I am prepared to do. I will enclose a morgen of ground on my farm and divide it into two equal parts, give the non-burner his choice of either half, which, of course, will not be burned, and I will burn the other every year for, say, four or five years. Then at the end of five years we will drive in a few sheep,

horses, or cattle for, say, two days, keeping check by the watch of the time they spend feeding on the portion that has not been burned and also the time they spend feeding on the other, and if they spend more time grazing on the unburned portion than on the other I will give ten pounds towards any hospital the non-burner likes to name. On the other hand, if they spend more time grazing on the burned portion, then the non-burner will have to give ten pounds to the hospital I will name. There will be no fear whatever of his losing his money, for according to the theory of these gentlemen, after the grass has been burned five years in succession it will have become so coarse and sour that the stock will not go near it. The very smell of it will keep them off

And then I will give him another chance of gaining another ten pounds for his pet hospital. I will put a fence between the two pieces of ground and we will put two sheep on either piece; and, again, if the two sheep on the unburned portion are in better order than the other two two months after, then I will give another ten pounds to the hospital, but if the two on the burned portion are better than the other two then he will have to give the ten pounds. Here, again, he will be quite safe, for it is impossible for sheep to do as well on coarse sour grass as they will on that which is fine and sweet.

Or, if he considers the foregoing not a fair test then let him suggest something and I will try to meet him.

Now, Mr. Editor, we will see if any of these gentlemen who hold that burning grass spoils it will have the courage to back up his opinion with his money.

Messrs. Prances and Claasse deserve credit for their patriotism in writing upon this subject of grass-burning. I have no doubt that they have given us their honest opinion, and they wrote the letters believing that they were thereby doing the country a service. However, I can put Mr. Prances in the way of proving to himself that he is wrong when he says that burning grass makes it sour. He tells us that he has a small paddock out of which he keeps his cows, and that he burns it every year. Now let him continue to keep his cows and all other animals out of it, but let him discontinue burning it for, say, five years, and then let him be honest with us and tell us through the *Agricultural Journal* whether it has become any sweeter.

Burning grass neither makes it sour nor sweet, but what it does is to make it grow more vigorously, makes it more succulent and more nutritious. And because of this vigorous growth people jump to the conclusion that it is becoming coarse and sour. I, in my ignorance, always thought that it was the ashes that in a manner manured the ground and caused this vigorous growth, but some time ago we were told in the *Agricultural Journal* that if ground is heated up to a certain point certain bacteria that are themselves useless in the ground and that prey upon other bacteria that are beneficial to the soil, are killed, while the other little fellow escapes unhurt, and when he no longer had to dodge about to escape from his cannibal brother he grows fat, multiplies, and fructifies the soil. Whether it is the ash that makes the ground fruitful, or the heat that kills the cannibal, or a combination of both, or something else altogether, I know not, but the fact remains that burned grass does grow very vigorously, and it is no more becoming sour than wheat that is growing on well-manured good ground is becoming sour because it has

thicker straw and gives double or treble the yield that wheat growing on poor soil does. I have seen sheep walk for miles from the kraal without putting their heads to the ground to feed in order to get to burned grass, and when they got near it they used to commence running the way sheep do when they are making for a field of green barley; but, of course, sheep being very stupid animals doubtless prefer coarse sour grass to that which is fine and sweet.

In conclusion, another evil that is put down to grass-burning is that it causes sluiting, and this also is a fallacy. It is not the farms upon which grass grows long enough to burn that wash into sluits, but those that are tramped and fed down to the roots by stock.

I am sorry this letter is so long, but the subject is of paramount importance, and you are at liberty to condense it, if you like, so long as you do not destroy the sense.—Yours, etc.,

W. B. PHILLIPS.

Tarkastad.

# Report of Fruit Cold Storage Experiments, Capetown, Season 1912-13.

THE following has been received from the Government Fruit Inspector, Capetown Docks, by the Government Horticulturist:—

In compliance with instructions received from you I have carried out further cold storage experiments with regard to fruit. These experiments were carried out on slightly different lines to that of last year, the object being not only to find out the best temperature to carry export fruit, but also to discover as far as possible what effect the soil and climatic conditions had on the keeping qualities of the different fruits. The experiments were commenced on the 18th December, 1912, and carried on to the 10th of April, 1913.

The following is a list of the varieties and quantities of fruit received:—

Apricots, 3.
Peaches—Alexander, 5; Cape, 10; Yellow Flesh, 13.
Plums—Wickson, 20; Kelseys, 8; Apple, 3; Burbank, 3.
Nectarines, 8.
Grapes—Hermitage, 30; Hanepoot, 24; Gros Colman, 6; Raisin Blanc, 9; Barbarossa, 9; Muscat Hambro, 3; Waltham Cross, 9; Golden Queen, 3.
Plums—Chalcot, 2; Shiro, 1.
Pears—B.C., 13; B.B., 1; B. Hardy, 8; Flemish, 1; L. Bonne, 5; B. Biel, 1; E. Buerre, 1; D. d'Angouline, 1; B. Clairgeau, 1.

Three cool chambers were placed at my disposal by the harbour official; these were run at the following temperatures, viz.:—

No. 10—28 to 30 degrees.
No. 11—32 to 34 degrees.
No. 12—36 to 38 degrees.

The average temperature of the ripening-room, where the fruit was placed after being taken out of the cool chambers, was from 55 to 60 degrees. Of the total quantity of fruit received the following quantities were allocated to the different chambers:—

28 to 30 degrees—61 boxes.
32 to 34 degrees—88 boxes.
36 to 38 degrees—66 boxes.

The fruit being left in the chambers for periods ranging from eighteen to thirty days, the various boxes were examined after the required time in the cool chambers and then placed in the passage to ripen up, where it was again examined periodically.

*Apricots.*—One box was placed in No. 10 chamber and two in No. 12. They were kept from twenty-three to thirty days, after which they were kept from two to six days. The fruit that was picked on the ripe side turned out well and was of good flavour; the greener fruit, without exception, did not colour up well, and became very woolly.

*Peaches, Alexander.*—Five boxes of these were placed in No. 12 chamber, three of which were kept for twenty-nine days and two for thirty days; one box was picked green, kept splendidly, and had a splendid appearance for five days after removal from the chamber, but on examination was found to be very woolly. Another box from the same farm and gathered under similar conditions contained fruit which was grown on two distinct soils, viz., sand and clay, the latter being under irrigation. It was found that the fruit grown on clay soil kept two days longer and was much superior in flavour. I account for this by the dry season and that the trees in the sandy soil suffered from drought; the other three boxes were packed when the fruit was fully matured, and turned out in excellent condition and had good flavour.

This variety being very scarce this season, it was found difficult to obtain a larger number.

*Peaches, Yellow Fleshed.*—These boxes consisted of the following varieties: Early Crawfords, Muirs, Foster, Elbertas, Constantia Beauty, and Gladstone. These were placed in the several temperatures and kept for different lengths of time, and with the exception of one box they all went woolly. The one exception was packed fully ripe, and after being kept twenty-four days in the lowest temperature kept for only four days after removal from the chamber. Most of these fruits kept their character as long as they were in the cool chamber, provided they were packed in a ripe condition; this especially applies to the Elberta variety. I am thoroughly convinced after the last two years' experiments that the Yellow Fleshed peaches are absolutely useless for the export trade, as they cannot stand the lengthy storage required.

*Plums, Wickson.*—The experiment with this class of plum was very interesting. Four boxes were placed in No. 10 chamber, eight in No. 11, and seven in No. 12. These were kept in the chambers for

various periods, from twenty-one to twenty-eight days. One box was kept at 50 degrees at the request of the grower; this only kept for twelve days, when it was found to be wasted. In every case the boxes kept in the warmer temperature went off more rapidly than those in the cooler chambers.

The fruit grown on hillside, gravelly, and sandy soil all retained its appearance, coloured up nicely, and was of excellent flavour, whereas the fruit grown on the clays and heavy soils, although of larger size and of good appearance, when eaten was quite flavourless.

I am convinced that most growers gather this variety of fruit much too green to arrive in England in the best condition.

*Plums, Kelseys.*—These were placed two in No. 12 and six in No. 11. The first were received on February the 18th; these were certainly picked too green, and were kept for twenty-three days. The one box took eight days and the other nineteen days before ripening up, and was then found to have no flavour.

Again, with this fruit, it kept better after being in the coldest chamber. All the fruit came off similar soil, so there is no conclusion to be drawn in this respect. Some were tested to see if the spot they are subject to would develop further in cool store, but I found no further development under these conditions. This box was kept for twenty-six days in No. 11, and kept sound for ten days after removal.

*Plums, Apple.*—Three boxes of this variety were kept in chambers for twenty-eight days, and on removal from the chambers were found to be in very indifferent condition. There is no doubt that this particular plum requires careful handling. They bruise very easily, and yet should be picked in a ripe condition.

*Plums, Burbank.*—This variety has again proved itself altogether unsuitable to the London market. Of the three boxes one was kept for twenty-three days and the other three for twenty-seven days, and in every case, though the fruit had a sound appearance, it was found to be flavourless.

*Plums, Sultan.*—Only one box of this variety was used, and after being twenty-six days in store was returned to grower. It has been found by experience of growers that only the "first crop" of this is suitable for export, the latter crops not carrying.

*Plums, Chalcot.*—The two boxes of this variety were placed in No. 11 chamber. One was kept for twenty-eight days and the other for thirty days, the idea being to test the keeping capabilities for the American market. They both appeared in sound condition, and kept for five days after in the same sound state.

*Plums, Shiro.*—One box of this was received. The fruit was in sound condition on receipt, being placed in No. 12 for twenty-six days. On removal they turned soft, dry, and flavourless. This is an absolutely useless variety for the purpose of export.

*Pears, B. C.*—Thirteen boxes of this variety were received, seven of which were placed in No. 10, four in No. 11, and two in No. 12. These were kept for periods ranging from twenty-three to thirty-two days in the chambers and afterwards kept from one to thirteen days to ripen. The severest test was one box kept in No. 10 for thirty-two days, and which was kept for thirteen days afterwards and was then found to be in good flavour and condition. The fruit kept in No. 10 kept longer after removal than the other lots, whereas No. 12 showed poor results. The fruit grown on sandy soil turned out mealy and of

poor flavour. There is no doubt that the principal point for the growers to have in mind to get the best results from this variety is to see that it is gathered whilst the fruit is still firm with no signs of ripeness; in fact it should be plucked green than otherwise.

*Pears, B. B.*—Only one box of this variety was received. Knowing its good-keeping qualities it was not deemed necessary to get a large quantity. This fruit was grown in sandy soil, and was kept for twenty-six days in No. 10, and afterwards was kept for thirteen days to ripen up; these turned out mealy in condition.

*Pears, B. Hardy.*—Eight boxes of these were received, one being placed in No. 10, four in No. 11, and three in No. 12 chambers, and were kept for periods varying from twenty-five to thirty-two days, and afterwards kept for from six to sixteen days. Of the three boxes kept in No. 12, one kept for six days and the other for nine days after removal, and only one box was at all satisfactory. The other two were very poor in appearance, having gone shrivelled and gone mealy. They were all good in the other two chambers, the box from No. 10 keeping sound the longest.

*Pears, Flemish Beauty.*—Only one box of this was received and placed in No. 11 for twenty-nine days and kept for seven days, when it was found in good condition.

*Pears, Louis Bonne.*—Five boxes of this were received. One was placed in No. 10, three in No. 11, and one in No. 12 chambers. They were kept for twenty-five, twenty-six, and twenty-seven days, and afterwards kept sound for from seven to ten days, the box from No. 12 keeping good for only seven days, and the one in No. 10 for sixteen days.

*Pears, B. Biel.*—One box of this was kept for twenty-five days in No. 10, and afterwards took twenty days to ripen up, when it was found that the fruit was good.

*Pears, Easter Beurre.*—One box was kept for twenty-five days in No. 11. The fruit took twenty days to ripen up after removal from the chamber, and turned out of fair flavour.

*Pears, B. Clairgeau.*—One box was kept for twenty-five days in No. 11 and afterwards kept for sixteen days to ripen up, when it was found in good appearance and of fair flavour.

*Pears, Duchess d'Angouline.*—One box was kept for twenty-five days in No. 11 and was kept afterwards for thirteen days to ripen up, when the fruit was found of good flavour.

*Nectarines.*—Eight boxes of these were received; one of each was kept in chambers No. 10, 11, and 12. These were given a severe test by keeping them for thirty-two days, and afterwards kept for five days. Those in No. 10 and 11 turned out equally well. Those in No. 12 went woolly. The one box placed in No. 11 kept for four days afterwards, and on being opened it was found of good appearance, but was decidedly acid, and was evidently packed too green. The other five boxes wese sent by Dr. Horace Brown, whose representative, Mr. Lindsell, attended at the docks to closely watch the experiment. One box was placed each in No. 10, one in No. 11, and three in No. 12. Dr. Brown being of opinion that fruit was carried at too low a temperature, more fruit was placed in No. 12 for that reason; the result, however, disproved this contention, as the fruit placed in No. 10 kept longer and in better condition than any of the others.

*Grapes, Hermitage.*—Thirty boxes of these were used, and having this large quantity I was able to vary my tests. Nine boxes were

placed in No. 10, eleven boxes in No. 11, and ten boxes in No. 12. They were kept in for periods varying from twenty-three to thirty-two days, and afterwards kept for periods of from two to fifteen days. They were all tested for sugar content, and were found to vary from 15 per cent. to 22 per cent. Again, as with previous fruit reported upon, these kept longer in Nos. 10 and 11 than those in No. 12. Four boxes of the latter were found to be wasty on removal from the chamber, whereas the shortest time others were kept was seven days. With regard to the sugar tests, the fruit with a lower percentage than 19 per cent. was decidedly sour. Twenty-three days seem to be the limit that these grapes will stand cold storage if required to keep a week or more after removal. Those kept in cold stores for thirty-two days went off rapidly after removal. In one instance I had grapes gathered under similar conditions from adjoining farms from clay soil and hillside. Of these, those from the hillside kept and lasted much longer than the others, and were infinitely of better flavour.

*Grapes Hanepoot.*—Twenty-four boxes in all of this variety were used, seven being placed in No. 10, nine in No. 11, and eight in No. 12, and were kept for periods from twenty-three to thirty-two days. Again with this variety as with the last, in the lower temperature the fruit kept sounder and longer. Most of the grapes of this variety, on being tested for sugar, showed 23 per cent. to 24 per cent., so that it is hard to make a recommendation, but as they all turned out fairly well, would suggest 22 per cent. as a minimum.

*Grapes Raisin Blanc.*—Twelve boxes of this variety were used, three were placed in No. 10, five in No. 11, and four in No. 12, and kept from twenty-five to thirty-two days. These also kept better in the lower temperatures, although not to so marked a difference as the other varieties; those showing a sugar percentage of 16 per cent. keeping best. Those that averaged 19 per cent. were too ripe and did not keep so well.

*Grapes, Barbarossa.*—Nine boxes of these were used, three being placed in each chamber for periods of from twenty-three to thirty-two days. The difference was more marked in this than in any other variety, those in the higher temperatures keeping very badly. For sugar percentage I would suggest 15 per cent. as the minimum.

*Grapes, Muscat Hambro.*—Only three boxes of this variety were used, one of which was returned to grower by request. One each of the other two boxes were placed in Nos. 10 and 11 for twenty-seven days; that in No. 10 kept for thirteen days and the other for seven days sound after removal from the chambers; the former showed 22 per cent. and the other 19 per cent. of sugar.

*Grapes, Waltham Cross.*—Nine boxes of these were used, three being placed in each chamber for from twenty-three to thirty-two days. They all proved good keepers and showed very little difference in appearance, and as they all tested 17 per cent. to 18 per cent. sugar would suggest 17 per cent. minimum.

*Grapes, Gros Colman.*—As there were only three boxes of this variety received, and all from the same spot, it would be unwise for me to make any recommendation. These were kept for twenty days in the several chambers, and, but for slight shrivelling, kept good for ten days after removal; the sugar test of these was 17 per cent.

*Grapes, Golden Queen.*—Three boxes of these were used, and all from the same vineyard. They were placed a box in each chamber.

They all went wasty, and consider they were too ripe on receipt, being 20 per cent. sugar, so would not draw any conclusion in regard to this variety.

### GENERAL COMMENTS.

There is no doubt that, as a result of these experiments, it has been conclusively proved that the temperatures that have been used for the carriage of fruit in previous years have been too high, and that the ideal temperature to get fruit to arrive (when all varieties have to be carried in the same chamber) on the London market in the best condition, i.e. so that it will keep for a week or ten days after removal from the ship's cool storage (and then be of good character and flavour), is 32 degrees; and should there be any danger of the temperature varying on the different carrying steamers, there will be no fear of damage being done to the fruit by the temperatures dropping (No. 10 chamber being kept at from 28 to 30 degrees), but grave danger when the temperature is allowed to rise.

I am still of opinion that much of our fruit is picked in altogether to) green a condition. This refers more particularly to plums, peaches, and early grapes, and it is hoped that the growers will try to improve on this. The rush to have the fruit first on the market may be of some advantage to the one that gets there first, but should all the growers in the early districts take the same attitude I fear it would ruin the good name of South African fruit in the oversea markets.

With regard to soil suitable for fruit growing, I am convinced that the hillside is best for plums; alluvial soil, free from clay, and hillside for grapes; heavy soils, including clays, for pears; and river silt and alluvial deposits for peaches. Where irrigation is done scientifically, and not too soon before gathering fruit, it is a help and will do no harm to the carrying qualities of the fruit.

As the grape is one of the principal export fruits at present, I should like to make a special report of them. There is a great advantage if cut from the vines at least twelve hours before packing, and during damp weather they should be cut at least twenty-four hours before packing. They should be thoroughly thinned, dense bunches invariably going wasty first, and wherever oidium was seen on the grapes they went wasty very soon and were soon in a state of blue mould. I trust these experiments will be carried on for another season, as the last one has been a most favourable one for the fruit growers, there being little or no rain, and some places that I know of personally have not turned out fruit as would be generally expected. I do not think it necessary to carry out experiments further in regard to temperatures, but I consider it absolutely necessary to go further before we can draw strong enough conclusions, before we can make recommendations to growers with regard to the most suitable soils for the different varieties of fruit.

In conclusion, I wish to record my thanks to the following growers for the supplies of fruit for these experiments:—Meerlust Fruit Farms; J. van Niekerk, Esquire; Cape Orchard Co., Ltd.; Hon. Percy de Villiers; Dr. Horace Brown; J. P. du Toit, Esquire; P. J. Cillie, Esquire (C.'s son); Principal, Elsenburg College; Warden, Porter Reformatory; Manager, Government Wine Farm; Henry Meyers, Esquire; R. D. Koch, Esquire; Rowland Taylor, Esquire.

# Annual Stock Sales.

## LIST OF PURCHASERS.

## EXPERIMENTAL FARM, POTCHEFSTROOM.

## (12TH NOVEMBER, 1913.)

| Lot. | Purchaser. | Particulars. | Price. £ | s. | d. | Total. £ | s. | d. |
|---|---|---|---|---|---|---|---|---|
| 1 | J. R. Buhrmann, P.O. Box 104, Ermelo | 1 Thoroughbred Colt...... | 60 | 18 | 0 | 60 | 18 | 0 |
| 2 | R. A. Rouillard, Vryheid, Natal | 1 „ „ ...... | 36 | 15 | 0 | | | |
| 4 | „ „ „ | 1 „ „ ...... | 52 | 10 | 0 | | | |
| 5 | „ „ „ | 1 Ayrshire Bull, D0A 45P | 32 | 11 | 0 | | | |
| 10 | „ „ „ | 1 „ „ D0A 56P | 17 | 17 | 0 | | | |
| 18 | „ „ „ | 1 Shorthorn Coates Bull, D0A 23S | 69 | 6 | 0 | | | |
| 23 | „ „ „ | 1 Hereford Bull, D0A 23S | 32 | 11 | 0 | 252 | 0 | 0 |
| 51 | „ „ „ | 1 Large Black Boar, D0A 295P | 2 | 12 | 6 | | | |
| 52 | „ „ „ | 1 Large Black Sow, D0A 292P | 3 | 3 | 0 | | | |
| 53 | „ „ „ | 1 Large Black Sow, D0A 291P | 2 | 12 | 6 | | | |
| 56 | „ „ „ | 1 Large Black Sow, D0A 295P | 2 | 2 | 0 | | | |
| 3 | B. Cohen, P.O. Box 593, Kimberley | 1 Thoroughbred Colt...... | 42 | 0 | 0 | 42 | 0 | 0 |
| 5 | E. H. Chapman, Kuruman, Vryburg | 1 „ „ ...... | 64 | 1 | 0 | 64 | 1 | 0 |
| 6 | C. E. de Beer, Frederikstad Station | 1 „ „ ...... | 53 | 11 | 0 | | | |
| 4 | „ „ „ | 1 Large Black Boar, D0A 284P | 2 | 12 | 6 | 56 | 3 | 6 |
| 7 | W. Hosken, Johannesburg | 1 Clydesdale Colt......... | 43 | 1 | 0 | 45 | 3 | 0 |
| 15 | „ „ „ | 1 Berkshire Sow, D0A 139P | 2 | 2 | 0 | | | |
| 8 | J. N. Heymann, P.O. Box 43, Standerton | 1 Clydesdale Colt......... | 79 | 16 | 0 | | | |
| 3 | „ „ „ | 1 Fries Bull, D0A 33P... | 96 | 12 | 0 | 224 | 14 | 0 |
| 30 | „ „ „ | 1 Africander Bull, D0A 19P | 48 | 6 | 0 | | | |
| 9 | L. J. Erasmus, P.O. Strijdkraal, Standerton | 1 Clydesdale Colt......... | 72 | 9 | 0 | 72 | 9 | 0 |
| 1 | L. Burstein, Kaalkraal, P.O. Strijdonbrog, Hopetown | 1 Catalonian Jack, D0A 5S | 179 | 11 | 0 | 179 | 11 | 0 |
| 2 | Mrs. Disten, Middelburg, C.P. | 1 Catalonian Jack, D0A 6S | 105 | 0 | 0 | 105 | 0 | 0 |
| 3 | Rayner & Roberts, Tarka Bridge, Mortimer Station | 1 Catalonian Jack, D0A 7S | 189 | 0 | 0 | 189 | 0 | 0 |
| 4 | H. M. Brown, Vryburg.. | 1 Catalonian Jack, D0A 9S | 177 | 9 | 0 | 177 | 9 | 0 |
| 5 | L. Baumann, P.O. Kinross, Bethal | 1 Catalonian Jack, D0A 10S | 184 | 16 | 0 | 184 | 16 | 0 |
| 7 | Newberry Orange River Estates, Ltd., Winstead, P.O. Marydale, *via* Prieska | 1 Catalonian Jack, D0A 12S | 120 | 15 | 0 | 120 | 15 | 0 |
| | | *Carried forward*........... | .........£ | | | 1773 | 19 | 6 |

| Lot. | Purchaser. | Particulars. | Price. | Total. |
|---|---|---|---|---|
| | | | £ s. d. | £ s. d. |
| | | *Brought forward*.......... | .......... | 1773 19 6 |
| 1 | J. Friedmann, Kaalfontein, P.O. Pretoria | 1 Fries Bull, D0A 30P.... | 94 10 0 | 102 7 6 |
| 13 | ,, ,, ,, | 1 Suffolk Ram, D0A 74S. | 7 17 6 | |
| 2 | S. A. Wattles, Ltd., Bethal | 1 Fries Bull, D0A 32P.. | 91 7 0 | |
| 16 | ,, ,, ,, | 1 Large Black Boar, D0A 265P | 5 15 6 | 97 2 6 |
| 7 | C. G. White, Potchefstroom | 1 Angora Ram, D0A 58P. | 1 1 0 | 2 2 0 |
| 15 | ,, ,, ,, | 1 ,, ,, D0A 72P. | 1 1 0 | |
| 12 | J. F. van Brummelen, Rietfontein, Bank Station | 1 ,, ,, D0A 66P. | 4 4 0 | 4 4 0 |
| 13 | Chas. Maggs, Moorddrift, Pretoria | 1 ,, ,, D0A 68P. | 1 11 6 | |
| 14 | ,, ,, ,, | 1 ,, ,, D0A 70P. | 2 12 6 | |
| 3 | ,, ,, ,, | 1 Berkshire Boar, D0A 145P | 4 4 0 | 11 11 0 |
| 9 | ,, ,, ,, | 1 Berkshire Boar, D0A 147P | 3 3 0 | |
| 16 | J. J. Minnaar, Hopetown, Krantzkuil Station | 1 Angora Ram, D0A 73P. | 1 1 0 | 2 2 0 |
| 18 | ,, ,, ,, | 1 ,, ,, D0A 76P. | 1 1 0 | |
| 1 | Ludwig Bros., P.O. Groot Spelonken | 1 Berkshire Boar, D0A 143P | 8 0 0 | 8 0 0 |
| 2 | C. W. Hudson, Ventersdorp | 1 Berkshire Boar, D0A 144P | 9 19 6 | |
| 34 | ,, , ,, | 1 Large Black Boar, D0A 282P | 1 1 0 | |
| 35 | ,, ,, ,, | 1 Large Black Sow, D0A 273P | 4 4 0 | |
| 37 | ,, ,, ,, | 1 Large Black Sow, D0A 280P | 1 1 0 | 19 8 6 |
| 38 | ,, ,, ,, | 1 Large Black Sow, D0A 283P | 1 1 0 | |
| 45 | ,, ,, ,, | 2 Large Black Sows, D0A 268P | 2 2 0 | |
| 4 | A. W. Guthrie, P.O. Box 502, Port Elizabeth | 1 Berkshire Sow, D0A 124P | 6 16 6 | |
| 5 | ,, ,, ,, | 1 ,, ,, D0A 126P | 5 15 6 | 16 0 3 |
| 8 | ,, ,, ,, | 1 ,, ,, D0A 129P | 3 8 3 | |
| 6 | H. du Preez, Elandsfontein, Bank Station | 1 ,, ,, D0A 127P | 2 12 6 | |
| 12 | ,, ,, ,, | 1 ,, ,, D0A 134P | 2 12 6 | 9 9 0 |
| 25 | ,, ,, ,, | 1 Large Black Boar, D0A 270P | 4 4 0 | |
| 4 | G. Jones, Woodlands, Amalinda Station, C.P. | 1 Fries Bull, D0A 34P.... | 86 2 0 | 86 2 0 |
| 6 | E. van Zyl, Carnarvon... | 1 Ayrshire Bull, D0A 47P | 28 17 6 | 28 17 6 |
| 7 | Col. J. Byron, Westminster | 1 ,, ,, D0A 48P | 26 5 0 | 26 5 0 |
| 9 | Mrs. Roxburgh, Oliphants River Station, District Middelburg | 1 Ayrshire Bull, D0A 55P | 21 0 0 | 37 16 0 |
| 11 | ,, ,, ,, | 1 ,, ,, D0A 58P | 16 16 0 | |
| 12 | J. W. Thomas, Langes Nek, Charlestown | 1 Lincoln Red Shorthorn Bull, D0A 37P | 75 12 0 | 75 12 0 |
| 14 | F. P. Mockford, P.O. Box 96, Pietersburg | 1 Shorthorn Coates Bull, D0A 30S | 31 10 0 | 65 2 0 |
| 15 | ,, ,, , | 1 Shorthorn Coates Bull, D0A 29S | 33 12 0 | |
| | | *Carried forward*.......... | .........£ | 2366 0 9 |

| Lot. | Purchaser. | Particulars. | Price. | Total. |
|---|---|---|---|---|
| | | | £ s. d. | £ s. d. |
| | | *Brought forward*.......... | .......... | 2366 0 9 |
| 8 | W. MacBarren, Geluk, Schweizer Reneke, Bloemhof | 1 Ayrshire Bull, D0A 50P | 15 15 0 | |
| 1 | ,, ,, ,, | 1 Wanganella Ram, D0A 561E | 8 8 0 | |
| 2 | ,, ,, ,, | 1 Wanganella Ram, D0A 573E | 6 16 6 | |
| 3 | ,, ,, ,, | 1 Wanganella Ram, D0A 595E | 9 9 0 | 47 15 6 |
| 6 | ,, ,, ,, | 1 Angora Ram, D0A 57P. | 1 1 0 | |
| 8 | ,, ,, ,, | 1 ,, ,, D0A 60P. | 1 1 0 | |
| 9 | ,, ,, ,, | 1 ,, ,, D0A 61P. | 1 1 0 | |
| 11 | ,, ,, ,, | 1 ,, ,, D0A 64P. | 1 1 0 | |
| 40 | ,, ,, ,, | 1 Large Black Boar, D0A 290P | 3 3 0 | |
| 13 | H. Smith, Khuma, Koekemoer | 1 Lincoln Red Shorthorn Bull, D0A 39P | 61 19 0 | 61 19 0 |
| 16 | J. Webster, Wildebeestfontein, Fortuna, Heidelberg | 1 Shorthorn Coates Bull, D0A 19S | 63 0 0 | 63 0 0 |
| 17 | Hardwick, Scramber, & Symons, Rustenburg | 1 Shorthorn Coates Bull, D0A 21S | 42 0 0 | 42 0 0 |
| 19 | E. C. Hodgson, P.O. Box 33, Benoni | 1 Shorthorn Coates Bull, D0A 20S | 55 13 0 | |
| 32 | ,, ,, ,, | 1 Large Black Boar, D0A D0A 278P | 3 13 6 | 61 8 6 |
| 42 | ,, ,, ,, | 1 Large Black Boar, D0A 285P | 2 2 0 | |
| 20 | F. S. Rundle, P.O. Vryheid | 1 Shorthorn Coates Bull, D0A 27S | 85 1 0 | 85 1 0 |
| 21 | O. Curtis Sotchell, Maraisburg, Groot Marico Station | 1 Shorthorn Coates Bull, D0A 28S | 44 2 0 | |
| 15 | ,, ,, ,, | 1 Suffolk Down Ram, D0A 85S | 9 19 6 | 57 4 6 |
| 1 | ,, ,, ,, | 1 Angora Ram, D0A 43P. | 2 2 0 | |
| 3 | ,, ,, ,, | 1 ,, ,, D0A 52P. | 1 1 0 | |
| 22 | L. J. Erasmus, Kaallaagte, Koster Station | 1 Shorthorn Coates Bull, "Secret Sovereign" | 71 8 0 | 71 8 0 |
| 24 | Vereeniging Estates, Vereeniging | 1 Hereford Bull, D0A 26S | 89 5 0 | 180 12 0 |
| 26 | ,, ,, ,, | 1 ,, ,, D0A 24S | 91 7 0 | |
| 25 | R. A. Barry, Lichtenburg.. | 1 ,, ,, D0A 29S | 53 11 0 | 53 11 0 |
| 27 | L. G. Herd, Rustenburg... | 1 Sussex Bull, D0A 53P.. | 52 10 0 | 52 10 0 |
| 28 | Dr. Orford, Klerksdorp.... | 1 ,, ,, D0A 55P.. | 54 12 0 | 54 12 0 |
| 29 | P. P. Fyfe, Lunsklip Siding, Pietpotgietersrust | 1 ,, ,, D0A 50P.. | 67 4 0 | 67 4 0 |
| 31 | P. J. Vermaak, Tigerbosch, P.O. Wolvefontein | 1 Africander Bull, D0A 20P | 42 0 0 | |
| 00 | ,, ,, ,, | 1 Angora Ram, D0A 55P. | 2 12 6 | 46 4 0 |
| 00 | ,, ,, ,, | 1 ,, ,, D0A 74P. | 1 11 6 | |
| 4 | L. Lack, Belfast.......... | 1 Tasmanian Ram, D0A 515E | 7 17 6 | 16 16 0 |
| 6 | ,, ,, .......... | 1 Tasmanian Ram, D0A 534E | 8 18 6 | |
| 5 | R. Bohme, Matjesspruit... | 1 Tasmanian Ram, D0A 565E | 7 7 0 | 7 7 0 |
| | | *Carried forward*.......... | .........£ | 3334 13 3 |

| Lot. | Purchaser. | Stock Purchased. | Price. £ s. d. | Total. £ s. d. |
|---|---|---|---|---|
| | | *Brought forward*.......... | .......... | 3334 13 3 |
| 7 | P. J. van Wijk, P.O. Box 3, Vereeniging | 1 Wanganella Ram, D0A 82S | 17 17 0 | 17 17 0 |
| 8 | S. J. Hyde, Uitkijk, Leeuwdoorns | 1 Rambouillet Ram, D0A 89S | 3 3 0 | |
| 10 | " " " | 1 Rambouillet Ram, D0A 85S | 4 4 0 | 12 12 0 |
| 11 | " " " | 1 Rambouillet Ram, D0A 96S | 5 5 0 | |
| 9 | H. G. Nolan, Lichtenburg.. | 1 Rambouillet Ram, D0A 86S | 9 19 6 | 9 19 6 |
| 14 | Dr. Moll, Kroonstad....... | 1 Suffolk Ram, D0A 81S. | 8 8 0 | 17 17 0 |
| 17 | " " ....... | 1 " " D0A 95S. | 9 9 0 | |
| 16 | Robinson Bros., Bloemfontein | 1 " " D0A 87S. | 9 19 6 | 9 19 6 |
| 18 | Hagget & Ovens, Ventersdorp | 1 " " D0A 97S. | 10 10 0 | 10 10 0 |
| 19 | Montgomery & Phillips, P.O. Munnik | 1 " " D0A 100S | 9 9 0 | 9 9 0 |
| 20 | B. Joffe, Sannies Post, Lichtenburg | 1 " " D0A 101S | 9 19 6 | |
| 24 | " " " | 1 " " D0A 110S | 10 10 0 | 45 3 0 |
| 25 | " " " | 1 " " D0A 112S | 11 11 0 | |
| 26 | " " " | 1 " " D0A 114S | 13 2 6 | |
| 21 | T. E. Chapman, Mooi River, Natal | 1 " " D0A 104S | 9 19 6 | 9 19 6 |
| 22 | S. H. du Plessis, Rissik Street, Pretoria | 1 " " D0A 106S | 10 10 0 | 10 10 0 |
| 23 | N. Lindsay, Phillippolis.... | 1 " " D0A 109S | 8 8 0 | 8 8 0 |
| 2 | R. F. Dunning, Bloemhof | 1 Angora Ram, D0A 51P. | 1 11 6 | |
| 4 | " " " | 1 " " D0A 53P. | 1 1 0 | 3 13 6 |
| 0 | " " " | 1 " " D0A 63P. | 1 1 0 | |
| 7 | D. Yesel, Elandskuil, Ventersdorp | 1 Berkshire Sow, D0A 128P | 3 3 0 | 3 3 0 |
| 10 | P. J. du Toit, P.O. Box 93, Klerksdorp | 1 Berkshire Boar, 150P.. | 4 4 0 | |
| 11 | " " " | 1 " Sow, 133P.... | 2 2 0 | 13 18 3 |
| 46 | " " " | 1 Large Black Sow, 286P. | 4 9 3 | |
| 50 | " " " | 1 " " Boar, 293P | 3 3 0 | |
| 13 | T. M. Woollaston, Parys | 1 Berkshire Sow, D0A 137P | 2 2 0 | 5 5 0 |
| 14 | " " " | 1 " " 138P .. | 3 3 0 | |
| 17 | W. A. Martin, P.O. Box 1100, Johannesburg | 1 Large Black Sow, 269P. | 6 16 6 | |
| 18 | " " " | 1 " " " 267P. | 5 15 6 | 29 8 0 |
| 19 | " " " | 1 " " " 268P. | 5 15 6 | |
| 20 | " " " | 1 " " Boar 269P. | 11 0 6 | |
| 22 | T. Woodhouse, Dargle, Natal | 1 " " Sow, 263P. | 4 14 6 | |
| 24 | " " " | 1 " " " 265P. | 5 5 0 | 20 9 6 |
| 28 | " " " | 1 " " Boar, 266P | 5 15 6 | |
| 29 | " " " | 1 " " Sow, 271P. | 4 14 6 | |
| 23 | C. R. Rennie, Kokstad.... | 1 " " " 264P. | 6 16 6 | 6 16 6 |
| 26 | G. Singleton, Dargle....... | 1 " " Boar, 271P | 4 14 6 | 4 14 6 |
| 27 | G. A. Russell, Birchleigh... | 1 " " " 275P | 6 6 0 | 6 6 0 |
| 30 | K. Elser, P.O. Box 1817, Johannesburg | 1 " " Sow, 272P. | 5 5 0 | 5 5 0 |
| 33 | W. Jooste, Potchefstroom... | 1 " " Boar, 279P | 4 4 0 | 4 4 0 |
| | | *Carried forward*.......... | .........£ | 3600 1 0 |

| Lot. | Purchaser. | Particulars. | Price. | Total. |
|---|---|---|---|---|
| | | | £ s. d. | £ s. d. |
| | | *Brought forward*.......... | .......... | 3600 1 0 |
| 36 | Geo. Parker, Vierfontein... | 1 Large Black Sow, 275P. | 5 5 0 | |
| 49 | ,, ,, ,, ... | 1 ,, ,, Boar, 291P | 4 4 0 | 12 12 0 |
| 55 | ,, ,, ,, ... | 1 ,, ,, Sow, 293P. | 3 3 0 | |
| 39 | Dingle & Pinrose, P.O. Box 103, Randfontein | 1 Large Black Sow, D0A 285P | 1 11 6 | 1 11 6 |
| 44 | C. E. Sadler, Windsorton.. | 1 Large Black Boar, D0A 267P | 2 2 0 | 2 2 0 |
| 47 | W. Angus, Potchefstroom.. | 1 Large Black Sow, D0A 290P | 1 11 6 | 1 11 6 |
| | | | TOTAL...£ | 3,617 18 0 |
| | | | Poultry... | 48 11 3 |
| | | | TOTAL...£ | 3,666 9 3 |

AVERAGE PRICES.

*Sheep, Goats, and Pigs.*

| Breed. | No. Sold. | Highest Price. | Lowest Price. | Last Year's Average Price. | Average Price, 1913. | Total. |
|---|---|---|---|---|---|---|
| | | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. |
| *Rams.* | | | | | | |
| Wanganella........ | 4 | 17 17 0 | 6 16 6 | — | 10 12 7½ | 42 10 6 |
| Tasmanian Merino.. | 3 | 8 18 6 | 7 7 0 | 4 7 0 | 8 1 0 | 24 3 0 |
| Rambouillet Merino | 4 | 9 19 6 | 3 3 0 | 10 12 7½ | 5 12 10½ | 22 11 6 |
| Suffolk Down...... | 14 | 13 2 6 | 7 17 6 | 7 5 6 | 9 19 6 | 139 13 0 |
| Persian............ | — | — | — | — | — | — |
| Angora............ | 18 | 4 4 0 | 1 1 0 | 4 14 6 | 1 10 11 | 27 16 6 |
| *Boars and Sows.* | | | | | | |
| Berkshire.......... | 15 | 9 19 6 | 2 2 0 | 3 14 0 | 4 4 6 | 63 7 9 |
| Large Black....... | 36 | 11 0 6 | 1 1 0 | 4 5 5 | 4 0 0 | 144 2 3 |
| | | | | | TOTAL...£ | 464 4 6 |

*Horses and Donkeys.*

| Breed. | No. Sold. | Highest Price. | Lowest Price. | Last Year's Average Price. | Average Price, 1913. | Total. |
|---|---|---|---|---|---|---|
| Thoroughbred Colts | 5 | 60 18 0 | 42 0 0 | 84 0 0 | 51 12 6 | 309 15 0 |
| Clydesdale Colts.... | 3 | 79 16 0 | 43 1 0 | 113 8 0 | 65 2 0 | 195 6 0 |
| Catalonian Jacks... | 6 | 189 0 0 | 105 0 0 | 144 7 6 | 159 8 6 | 956 11 0 |
| | | | | | TOTAL...£ | 1,461 12 0 |

*Bulls.*

| Breed. | No. Sold. | Highest Price. | Lowest Price. | Last Year's Average Price. | Average Price, 1913. | Total. |
|---|---|---|---|---|---|---|
| Fries.............. | 4 | 96 12 0 | 86 2 0 | 98 8 9 | 92 2 9 | 368 11 0 |
| Ayrshire........... | 7 | 32 11 0 | 15 15 0 | 29 2 9 | 22 14 6 | 159 1 6 |
| Lincoln Red Shorthorn........... | 2 | 75 12 0 | 61 19 0 | 77 0 0 | 68 15 6 | 137 11 0 |
| Shorthorn Coates... | 9 | 85 1 0 | 31 10 0 | 75 6 10½ | 55 1 4 | 495 12 0 |
| Hereford........... | 4 | 91 7 0 | 32 11 0 | 73 10 0 | 66 13 6 | 266 14 0 |
| Sussex............. | 3 | 67 4 0 | 52 10 0 | 60 0 0 | 58 2 0 | 174 6 0 |
| Africander... ..... | 2 | 48 6 0 | 42 0 0 | 33 1 6 | 45 3 0 | 90 6 0 |
| | | | | | TOTAL...£ | 1,692 1 6 |

SUMMARY AVERAGE PRICES.

| | 1905. | 1906. | 1907. | 1908. | 1909. | 1910. | 1911. | 1912. | 1913. |
|---|---|---|---|---|---|---|---|---|---|
| | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. |
| *Horses.* | | | | | | | | | |
| Clydesdale Colts........ | — | — | — | — | 100 16 0 | 49 17 6 | — | 84 0 0 | 65 2 0 |
| Thoroughbred Colts..... | — | — | — | — | — | — | 76 13 0 | 113 8 0 | 51 12 0 |
| *Donkeys.* | | | | | | | | | |
| Catalonian Jacks....... | — | — | — | — | — | — | — | 144 7 6 | 159 8 6 |
| *Cattle.* | | | | | | | | | |
| Bulls, imported......... | 40 13 9 | 45 13 6 | 42 0 0 | 25 14 6 | 31 10 0 | — | — | — | 71 8 0 |
| Bulls bred on farm..... | 35 7 7 | 42 11 6 | 57 10 4 | 48 3 8 | 57 19 9 | 49 17 3 | 62 10 3 | 64 1 5 | 54 0 5 |
| *Sheep.* | | | | | | | | | |
| Rambouillet............ | — | — | — | 8 10 0 | — | 20 1 7 | — | 10 12 7½ | 5 12 10½ |
| Rambouillet, imported.. | — | — | — | 9 9 0 | — | — | — | — | — |
| Shropshire............. | — | — | — | — | — | 2 2 0 | — | — | — |
| Suffolk, imported....... | — | — | — | 10 17 5¼ | — | — | — | — | — |
| Suffolk, bred on farm.... | — | — | — | — | — | 4 19 3 | 4 1 4 | 7 5 6 | 9 19 6 |
| Tasmanian............. | — | — | — | — | — | 13 13 0 | 12 0 5 | 4 7 0 | 8 1 0 |
| Wanganella............ | — | — | — | — | — | — | — | — | 10 12 7½ |
| Persian................ | — | — | — | — | — | — | 1 15 10 | 2 10 9 | — |
| Angora Rams.......... | — | — | — | — | — | — | 4 6 4 | 4 14 6 | 1 10 11 |
| *Pigs.* | | | | | | | | | |
| Boars and Sows, imported.............. | — | — | — | 9 9 0 | 8 8 0 | — | 19 19 0 | — | — |
| Boars and Sows, bred on farm.............. | — | 4 7 9 | 3 9 3½ | 4 3 5 | 4 18 6 | 7 3 11 | 8 8 3 | 4 0 7 | 4 1 4 |

DISTRICT SUMMARY.

| DISTRICT, ETC. | STOCK PURCHASED. | | | | | | TOTAL VALUE. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Stallions. | Catalonian Jacks. | Bulls. | Rams. | Angora Rams. | Pigs—Boars & Sows. | £ | s. | d. |
| Transvaal Province | | | | | | | | | |
| Bethal.......... | — | 1 | 1 | — | — | 1 | 281 | 18 | 6 |
| Belfast......... | — | — | 1 | 2 | — | — | 16 | 16 | 0 |
| Bloemhof....... | — | — | 1 | 5 | 7 | 1 | 68 | 15 | 6 |
| Ermelo......... | 1 | — | — | — | — | — | 60 | 18 | 0 |
| Heidelberg...... | — | — | 1 | — | — | — | 63 | 0 | 0 |
| Lichtenburg...... | — | — | 1 | 5 | — | — | 108 | 13 | 6 |
| Marico .......... | — | — | 1 | 1 | 2 | — | 57 | 4 | 6 |
| Middelburg...... | — | — | 2 | — | — | — | 37 | 16 | 0 |
| Potchefstroom and Klerksdorp | 1 | — | 5 | 2 | 5 | 17 | 485 | 17 | 9 |
| Pietersburg..... | — | — | 2 | 1 | — | 1 | 82 | 11 | 0 |
| Pretoria......... | — | — | 1 | 2 | 2 | 3 | 130 | 14 | 6 |
| Rustenburg..... | — | — | 3 | — | — | — | 165 | 18 | 0 |
| Standerton...... | 2 | — | 2 | — | — | — | 297 | 3 | 0 |
| Waterberg...... | — | — | 1 | — | — | — | 67 | 4 | 0 |
| Witwatersrand.. | 1 | — | 1 | — | — | 9 | 142 | 16 | 0 |
| Wolmaransstad.. | — | — | — | — | 3 | — | 12 | 12 | 0 |
| Cape Province..... | 2 | 5 | 2 | — | 2 | 5 | 1,019 | 16 | 3 |
| Natal Province.... | 2 | — | 6 | 1 | 1 | 9 | 447 | 16 | 6 |
| Orange Free State Province....... | — | — | 1 | 3 | — | 5 | 70 | 7 | 0 |
| TOTALS....... | 9 | 6 | 32 | 22 | 22 | 51 | £3,617 | 18 | 0 |

## STUD FARM, TWEESPRUIT, O.F.S.

### (FROM GROOTVLEI, ROODEPOORT, AND TWEESPRUIT FARMS.)

### (30TH OCTOBER, 1913.)

| Lot. | Purchaser. | Stock Purchased. | Price. | | | Total. | | |
|---|---|---|---|---|---|---|---|---|
| | | | £ | s. | d. | £ | s. | d. |
| A | D. McPherson, Ngoanwana, Tweespruit | Thoroughbred Stallion, "Dominie II" | 75 | 0 | 0 | 75 | 0 | 0 |
| B | J. J. Gertenbach, Philippolis | Thoroughbred Stallion, "The Negus" | 70 | 0 | 0 | | | |
| 39 | " " " | Wanganella Ram No. 28.. | 10 | 0 | 0 | | | |
| 42 | " " " | " " " 27.. | 11 | 0 | 0 | | | |
| 49 | " " " | " " " 583. | 20 | 0 | 0 | 146 | 0 | 0 |
| 51 | " " " | " " " 530. | 12 | 0 | 0 | | | |
| 60 | " " " | " " " 584. | 14 | 0 | 0 | | | |
| 70 | " " " | " " " 399. | 9 | 0 | 0 | | | |
| C | J. McCalman, Reitz....... | Thoroughbred Stallion, "Grand Slam" | 50 | 0 | 0 | 50 | 0 | 0 |
| 1 | P. A. Venter, Donkerpoort, Waterworks | Thoroughbred Colt, "Altitude" | 45 | 0 | 0 | 45 | 0 | 0 |
| 2 | P. J. Swanepoel, Kalkhoek, Zastron | Thoroughbred Colt, "Willow Wood" | 40 | 0 | 0 | 151 | 10 | |
| 33 | " " " | Wanganella Ram No. 23.. | 9 | 0 | 0 | | | |
| 35 | " " " | " " " 961. | 102 | 10 | 0 | | | |
| 3 | P. J. Truter, Bokpoort, Beaufort West | Oldenburg Colt........... | 70 | 0 | 0 | | | |
| 55 | " " " | Wanganella Ram No. 537. | 22 | 0 | 0 | | | |
| 56 | " " " | " " " 538. | 26 | 0 | 0 | 139 | 0 | 0 |
| 85 | " " " | " " " 67.. | 11 | 10 | 0 | | | |
| 106 | " " " | 4 Cross Wanganella-Rambouillet Ram Lambs | 9 | 10 | 0 | | | |
| 4 | G. P. van Zijl, Vlakfontein, Bethulie | Clydesdale Colt, "Monteith" | 90 | 0 | 0 | | | |
| 20 | " " " | Fries Bull, "Roodepoort Bob" | 40 | 0 | 0 | 130 | 0 | 0 |
| 5 | H. Nicholson, Flora, Marquard | Clydesdale Colt, "Roodepoort Prince" | 105 | 0 | 0 | 105 | 0 | 0 |
| 6 | Visser Bros., Jagersfontein. | Catalonian Jack.......... | 100 | 0 | 0 | | | |
| 38 | " " " . | Wanganella Ram No. 35.. | 21 | 0 | 0 | 142 | 0 | 0 |
| 41 | " " " . | " " " 861. | 21 | 0 | 0 | | | |
| 7 | P. J. Stofberg, Marseilles.. | Thoroughbred Gelding, "Commando" | 40 | 0 | 0 | 40 | 0 | 0 |
| 8 | R. J. Baker, Killarney, Tweespruit | Hunter Filly, "Roodepoort Becky" | 35 | 0 | 0 | 35 | 0 | 0 |
| 9 | J. C. B. de la Harpe, Caledonspoort | Fries Bull, "Roodepoort Pat" | 50 | 0 | 0 | 50 | 0 | 0 |
| 10 | F. W. Schmidt, Kromspruit, Bloemfontein | Fries Bull, "Tweespruit Geert" | 75 | 0 | 0 | 75 | 0 | 0 |
| 11 | H. M. Wessels, Fraaiuitzicht, Ventersburg | Fries Bull, "Tweespruit Dirk" | 72 | 10 | 0 | 72 | 10 | 0 |
| 12 | Martin & Bradshaw, Bedford, Tweespruit | Fries Bull, "Tweespruit Geert II" | 40 | 0 | 0 | 40 | 0 | 0 |
| 14 | G. Handley, Normanby, Harden Heights, Natal | Fries Bull, "Tweespruit Rontje" | 55 | 0 | 0 | 55 | 0 | 0 |
| | | *Carried forward*........... | .........£ | | | 1351 | 0 | 0 |

| Lot. | Purchaser. | Stock Purchased. | Price. | | | Total. | | |
|---|---|---|---|---|---|---|---|---|
| | | | £ | s. | d. | £ | s. | d. |
| | | *Brought forward*.......... | .......... | | | 1351 | 0 | 0 |
| 15 | F. W. Salzmann, Bloemspruit, Bloemfontein | Fries Bull, "Tweespruit Albertus" | 97 | 10 | 0 | 97 | 10 | 0 |
| 16 | Wood Bros., Tweespruit.... | Fries Bull, "Roodepoort Tom" | 37 | 10 | 0 | 37 | 10 | 0 |
| 17 | R. Kolver, Mauritzkop, Philippolis Road | Fries Bull, "Roodepoort Leader" | 40 | 0 | 0 | | | |
| 101 | " " " | Tasmanian Ram No. 782. | 2 | 0 | 0 | 42 | 12 | 6 |
| 103 | " " " | " " " 19.. | 0 | 12 | 6 | | | |
| 18 | M. Miller, Tweespruit...... | Fries Bull, "Roodepoort Chappie" | 25 | 0 | 0 | 25 | 0 | 0 |
| 19 | T. Barry, Abrikooskop, Ficksburg | Fries Bull, "Bannerman" | 57 | 10 | 0 | 57 | 10 | 0 |
| 21 | J. de Braal, Zypherfontein, Trichardt, T. P. | Lincoln Red Bull, "Dandy Duke" | 50 | 0 | 0 | | | |
| 94 | " " " | Wanganella Ram No. 859. | 6 | 0 | 0 | 65 | 0 | 0 |
| 95 | " " " | " " " 30.. | 5 | 0 | 0 | | | |
| 99 | " " " | " " " 821. | 4 | 0 | 0 | | | |
| 23 | G. P. Kelly, Carlton, P.O. Westminster | Lincoln Red Bull, "Sultan" | 47 | 10 | 0 | | | |
| 25 | " " " | Lincoln Red Bull, "Monk" | 51 | 0 | 0 | | | |
| 32 | " " " | Wanganella Ram No. 22.. | 15 | 0 | 0 | | | |
| 57 | " " " | " " " 539. | 26 | 0 | 0 | | | |
| 59 | " " " | " " " 582. | 19 | 0 | 0 | | | |
| 74 | " " " | " " " 485. | 11 | 0 | 0 | | | |
| 91 | " " " | " " " 860. | 11 | 0 | 0 | 289 | 0 | 0 |
| 92 | " " " | " " " 22*. | 7 | 0 | 0 | | | |
| 96 | " " " | " " " 818. | 7 | 0 | 0 | | | |
| 98 | " " " | " " " 23*. | 6 | 10 | 0 | | | |
| 113 | " " " | 11 Cross Wanganella-Rambouillet Ewes | 55 | 0 | 0 | | | |
| 114 | " " " | 11 Cross Wanganella-Rambouillet Ewe Lambs | 33 | 0 | 0 | | | |
| 24 | G. G. Baldwin, England, Tweespruit | Lincoln Red Bull, "Baron" | 52 | 10 | 0 | | | |
| 58 | " " | Wanganella Ram No. 579. | 15 | 0 | 0 | 74 | 10 | 0 |
| 76 | " " " | " " " 491. | 7 | 0 | 0 | | | |
| 26 | W. Milligan, Ficksburg..... | South Devon Bull, "Roodepoort Ben" | 47 | 10 | 0 | 47 | 10 | 0 |
| 27 | J. M. Turvey, The Retreat, Ladybrand | South Devon Bull, "Roodepoort Hero" | 55 | 0 | 0 | | | |
| 82 | " " " | Wanganella Ram No. 377. | 11 | 0 | 0 | 83 | 0 | 0 |
| 86 | " " " | " " " 68.. | 10 | 0 | 0 | | | |
| 89 | " " " | " " " 78.. | 7 | 0 | 0 | | | |
| 28 | O. A. Oosthuizen, Vogelstruisleegte, Willowmore, C.P | South Devon Bull, "Bert" | 45 | 0 | 0 | | | |
| 50 | " " " | Wanganella Ram No. 529. | 16 | 0 | 0 | 104 | 0 | 0 |
| 54 | " " " | " " " 536. | 26 | 0 | 0 | | | |
| 110 | " " " | 11 Rambouillet Ewes..... | 17 | 0 | 0 | | | |
| 29 | D. J. de Villiers, Ficksburg | South Devon Bull, "Darling" | 52 | 10 | 0 | 52 | 10 | 0 |
| 30 | H. L. Good, Kimberley.... | North Devon Bull, "Gentle Boy" | 27 | 10 | 0 | 27 | 10 | 0 |
| 31 | H. Steyn, Mazelspoort, Bloemfontein | Wanganella Ram No. 12.. | 145 | 0 | 0 | 145 | 0 | 0 |
| | | *Carried forward*........... | .........£ | | | 2499 | 2 | 6 |

| Lot. | Purchaser. | Particulars. | Price. | Total. |
|---|---|---|---|---|
| | | | £ s. d. | £ s. d. |
| | | *Brought forward*.......... | .......... | 2499 2 6 |
| 34 | P. J. de Bruyn, Dundee, Westminster | Wanganella Ram No. 152, " Grootvlei Sambo " | 85 0 0 | 110 10 0 |
| 109 | ,, ,, ,, | 11 Rambouillet Ewes..... | 25 10 0 | |
| 36 | P. J. du Toit, Caroluspoort, Naauwpoort | Wanganella Ram No. 824. | 15 0 0 | 15 0 0 |
| 37 | J. A. Swanepoel, Kwartelfontein, Smithfield | ,, ,, ,, 823. | 105 0 0 | 105 0 0 |
| 43 | C. J. Muller, Fortuin, P.O. Don Don, O.F.S. | Tasmanian Ram No. 792. | 17 10 0 | 17 10 0 |
| 45 | G. E. Marillier, Slaate, Elliot, C.P. | ,, ,, ,, 31.. | 22 10 0 | 49 10 0 |
| 46 | ,, ,, ,, | ,, ,, ,, 21.. | 7 0 0 | |
| 52 | ,, ,, ,, | Wanganella Ram No. 532. | 10 0 0 | |
| 104 | ,, ,, ,, | 5 Cross Wanganella-Rambouillet Ram Lambs | 10 0 0 | |
| 47 | H. Wessels, q.q............ | Tasmanian Ram No. 20.. | 7 0 0 | 7 0 0 |
| 48 | A. C. Whittal, Montana, Tweespruit | ,, ,, ,, 17.. | 13 0 0 | 13 0 0 |
| 61 | W. Morgan, Schuinskop, Thaba 'Nchu | Wanganella Ram No. 310. | 10 0 0 | 10 0 0 |
| 62 | S. C. Rogers, Visgat, Lindley Road | ,, ,, ,, 336. | 11 0 0 | 55 0 0 |
| 63 | ,, ,, ,, | ,, ,, ,, 340. | 7 0 0 | |
| 69 | ,, ,, ,, | ,, ,, ,, 397. | 8 0 0 | |
| 77 | ,, ,, ,, | ,, ,, ,, 501. | 10 10 0 | |
| 80 | ,, ,, ,, | ,, ,, ,, 544. | 10 0 0 | |
| 83 | ,, ,, ,, | ,, ,, ,, 53.. | 8 10 0 | |
| 65 | J. C. van Rooy, Koppieskraal, Bethulie | ,, ,, ,, 359. | 13 0 0 | 20 10 0 |
| 75 | ,, ,, ,, | ,, ,, ,, 486. | 7 10 0 | |
| 66 | W. Usher, Khumoflats, Thaba 'Nchu | ,, ,, ,, 361. | 8 0 0 | 8 0 0 |
| 79 | W. Stewart, Waterford, Lindley Road | ,, ,, ,, 527. | 12 0 0 | 17 0 0 |
| 87 | ,, ,, ,, | ,, ,, ,, 72.. | 5 0 0 | |
| 84 | A. E. Garnett, Aldford, Westminster | ,, ,, ,, 72.. | 6 0 0 | 18 0 0 |
| 88 | ,, ,, ,, | ,, ,, ,, 73.. | 7 0 0 | |
| 90 | ,, ,, ,, | ,, ,, ,, 73.. | 5 0 0 | |
| 93 | L. Smith, Thaba 'Nchu.. | ,, ,, ,, 865. | 5 0 0 | 12 0 0 |
| 97 | ,, ,, ,, .. | ,, ,, ,, 820. | 7 0 0 | |
| 100 | R. A. Maitland, Satan, Tweespruit | Tasmanian Ram No. 781. | 4 0 0 | 7 10 0 |
| 102 | ,, ,, ,, | ,, ,, ,, 24.. | 3 10 0 | |
| 105 | G. J. van Tonder, Magdalen, Bloemfontein | 4 Cross Wanganella-Rambouillet Ram Lambs | 8 10 0 | 8 10 0 |
| 107 | C. N. Naude, La Roche, Varkensvlei | 11 Rambouillet Ewes..... | 20 0 0 | 20 0 0 |
| 108 | C. J. de Villiers, Poundesford, Bloemfontein | 11 ,, ,, ..... | 22 0 0 | 22 0 0 |
| 111 | H. Meintjes, Boomplaats, Trompsburg | 7 ,, ,, ..... | 11 10 0 | 11 10 0 |
| 112 | D. J. du Plessis, Nieuwjaarspruit, Wepener | 11 Cross Wanganella-Rambouillet Ewes | 93 10 0 | 93 10 0 |
| | | | TOTAL...£ | 3120 2 6 |

AVERAGE PRICES.

*Horses.*

| | No. Sold. | Highest Price. | | | Lowest Price. | | | Average Price. | | | Total. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | £ | s. | d. | £ | s. | d. | £ | s. | d. | £ | s. | d. |
| Thoroughbred Stallions, imported | 3 | 75 | 0 | 0 | 50 | 0 | 0 | 65 | 0 | 0 | 195 | 0 | 0 |
| Thoroughbred Colts............ | 2 | 45 | 0 | 0 | 40 | 0 | 0 | 42 | 10 | 0 | 85 | 0 | 0 |
| Oldenburg Colt................ | 1 | — | | | — | | | 70 | 0 | 0 | 70 | 0 | 0 |
| Clydesdale Colts............... | 2 | 105 | 0 | 0 | 90 | 0 | 0 | 97 | 10 | 0 | 195 | 0 | 0 |
| Thoroughbred Gelding......... | 1 | — | | | — | | | 40 | 0 | 0 | 40 | 0 | 0 |
| Hunter Filly.................. | 1 | — | | | — | | | 35 | 0 | 0 | 35 | 0 | 0 |
| Catalonian Jack............... | 1 | — | | | — | | | 100 | 0 | 0 | 100 | 0 | 0 |
| | | | | | | | | TOTAL...£ | | | 720 | 0 | 0 |

*Cattle.*

| | No. Sold. | Highest Price. | | | Lowest Price. | | | Average Price. | | | Total. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fries Bulls.................... | 11 | 97 | 10 | 0 | 25 | 0 | 0 | 53 | 12 | 9 | 590 | 0 | 0 |
| Lincoln Red Bulls............. | 4 | 52 | 10 | 0 | 47 | 10 | 0 | 50 | 5 | 0 | 201 | 0 | 0 |
| South Devon Bulls............ | 4 | 55 | 0 | 0 | 47 | 10 | 0 | 50 | 0 | 0 | 200 | 0 | 0 |
| North Devon Bull............. | 1 | — | | | — | | | 27 | 10 | 0 | 27 | 10 | 0 |
| | | | | | | | | TOTAL...£ | | | 1018 | 10 | 0 |

*Sheep.*

| | No. Sold. | Highest Price. | | | Lowest Price. | | | Average Price. | | | Total. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wanganella Rams, imported.... | 3 | 145 | 0 | 0 | 9 | 0 | 0 | 56 | 6 | 8 | 169 | 0 | 0 |
| Wanganella Rams, Orange Free State bred................ | 33 | 105 | 0 | 0 | 7 | 0 | 0 | 21 | 11 | 3 | 711 | 10 | 0 |
| Wanganella Flock Rams....... | 17 | 11 | 10 | 0 | 4 | 0 | 0 | 6 | 19 | 5 | 118 | 10 | 0 |
| Cross Wanganella-Rambouillet Ram Lambs............... | 13 | — | | | — | | | 2 | 3 | 1 | 28 | 0 | 0 |
| Cross Wanganella-Rambouillet Ewe Lambs................ | 11 | — | | | — | | | 3 | 0 | 0 | 33 | 0 | 0 |
| Wanganella 2-tooth Ewes...... | 22 | — | | | — | | | 6 | 15 | 0 | 148 | 10 | 0 |
| Tasmanian Rams.............. | 5 | 22 | 10 | 0 | 7 | 0 | 0 | 13 | 8 | 0 | 67 | 0 | 0 |
| Tasmanian Flock Rams........ | 4 | 4 | 0 | 0 | 0 | 12 | 6 | 2 | 10 | 8 | 10 | 2 | 6 |
| Rambouillet Ewes, imported.... | 44 | — | | | — | | | 1 | 18 | 5 | 84 | 10 | 0 |
| Rambouillet Ewes, Orange Free State bred................ | 7 | — | | | — | | | 1 | 12 | 10 | 11 | 10 | 0 |
| | | | | | | | | TOTAL...£ | | | 1381 | 12 | 6 |
| | TOTAL PROCEEDS FROM SALE.........£ | | | | | | | | | | 3120 | 2 | 6 |

SUMMARY OF YEARLY AVERAGE PRICES.

*Horses.*

| | Average Price, 1908. | Average Price, 1910. | Average Price, 1911. | Average Price, 1912. | Average Price, 1913. |
|---|---|---|---|---|---|
| | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. |
| Thoroughbred Stallions, imported............. | 101 0 0 | 60 0 0 | 140 0 0 | 84 3 4 | 65 0 0 |
| Thoroughbred Colts...... | — | — | 112 10 0 | 75 0 0 | 42 10 0 |
| Thoroughbred Mares, imported............... | — | — | 68 2 6 | 52 10 0 | — |
| Oldenburg Stallion, imported............... | — | — | — | 105 0 0 | — |
| Oldenburg Colts......... | — | — | — | — | 70 0 0 |
| Clydesdale Colts......... | — | — | 76 0 0 | — | 97 10 0 |
| Yorkshire Coach Stallion, imported............. | — | — | 110 0 0 | — | — |
| Thoroughbred Geldings... | — | — | — | — | 40 0 0 |
| Hunter Filly............ | — | — | — | — | 35 0 0 |
| Catalonian Jacks........ | — | — | — | — | 100 0 0 |

*Cattle.*

| | Average Price, 1908. | Average Price, 1910. | Average Price, 1911. | Average Price, 1912. | Average Price, 1913. |
|---|---|---|---|---|---|
| Fries Bulls (Colonial bred) | 52 13 4 | 67 10 0 | 59 2 9 | 43 2 6 | 53 12 9 |
| Lincoln Red Bulls (Colonial bred)............ | — | 49 10 0 | 38 14 6 | 12 10 0 | 50 5 0 |
| South Devon Bulls (Colonial bred)............ | — | — | — | — | 50 0 0 |
| North Devon Bulls (Colonial bred)............ | — | — | — | — | 27 10 0 |
| Fries Cows, imported.... | — | — | 59 12 6 | — | — |
| Coates' Shorthorn Cows, imported............. | — | 31 5 0 | — | — | — |

## STUD SHEEP FARM, ERMELO.

(22ND OCTOBER, 1913.)

| Lot No. | Name of Purchaser. | Address of Purchaser. | Particulars of Stock Purchased. | Price. £ s. d. | Total. £ s. d. |
|---|---|---|---|---|---|
| 1 | Swart, H. J. | Lydenburg, Vermont Siding | 1 Wanganella Stud Ram | 10 10 0 | |
| 88 | " " | " " | 4 Ewes* @ 31/6 each | 6 6 0 | 25 4 0 |
| 93 | " " | " " | 4 " * @ 21/- each | 4 4 0 | |
| 95 | " " | " " | 4 " * @ 21/- each | 4 4 0 | |
| 2 | Pilkington, W. H. | Syfergat, Leeuwdoorns | 1 Wanganella Stud Ram | 21 10 6 | |
| 84 | " " | " " | 4 Ewes* @ 42/- each | 8 8 0 | |
| 85 | " " | " " | 4 " * @ 52/6 each | 10 10 0 | 63 10 6 |
| 86 | " " | " " | 4 " * @ 52/6 each | 10 10 0 | |
| 87 | " " | " " | 4 " * @ 63/- each | 12 12 0 | |
| 3 | Breytenbach, N. J. | P.O. Breyten | 1 Wanganella Stud Ram | 15 4 6 | |
| 4 | " " | " " | 1 " " " | 12 12 0 | |
| 7 | " " | " " | 1 " Selected Flock Ram | 11 0 6 | 54 1 6 |
| 18 | " " | " " | 1 " " " " | 9 9 0 | |
| 25 | " " | " " | 1 " Flock Ram | 5 15 6 | |
| 5 | Blockley, — | Tweedronk, Standerton | 1 Wanganella Selected Flock Ram | 10 10 0 | |
| 10 | " | " " | 1 " " " " | 8 18 6 | |
| 12 | " | " " | 1 " " " " | 10 10 0 | |
| 13 | " | " " | 1 " " " " | 17 17 0 | 64 11 6 |
| 14 | " | " " | 1 " " " " | 7 7 0 | |
| 15 | " | " " | 1 " " " " | 4 4 0 | |
| 19 | " | " " | 1 " " " " | 5 5 0 | |
| 6 | Rabe, P. | P.O. Leeuwnek, Vryheid, Natal | 1 " " " " | 10 10 0 | 18 18 0 |
| 26 | " | " " " | 1 " Flock Ram | 8 8 0 | |
| 8 | Schultz, M. | Mooiplaats, Breyten | 1 " Selected Flock Ram | 11 0 6 | 22 1 0 |
| 9 | " | " " | 1 " " " " | 11 0 6 | |
| 11 | Du Toit, J. G. | Boschfontein, Minnaar Station | 1 " " " " | 11 0 6 | 18 18 0 |
| 24 | " | " " " | 1 " Flock Ram | 7 17 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 16 | Scheepers, G. F. | Sheepmoor Siding, Ermelo | 1 | Wanganella Selected Flock Ram | 5 5 0 | |
| 17 | " | " " | 1 | " " " " | 4 14 6 | |
| 20 | " | " " | 1 | " " " " | 6 6 0 | 37 16 0 |
| 22 | " | " " | 1 | " Flock Ram | 3 3 0 | |
| 27 | " | " " | 1 | " " " | 4 14 6 | |
| 28 | " | " " | 1 | Tasmanian-Merino Stud Ram | 13 13 0 | |
| 21 | Steenkamp, J. J. | Roodepoort, Ermelo | 1 | Wanganella Flock Ram | 7 17 6 | 7 17 6 |
| 23 | Kleynhans, A. G. | Ermelo District | 1 | " " " | 3 3 0 | |
| 66 | " | " " | 1 | Wanganella-Rambouillet Selected Flock Ram | 6 6 0 | |
| 69 | " | " " | 1 | " " " " " | 5 5 0 | 34 2 6 |
| 71 | " | " " | 1 | " " " " " | 4 14 6 | |
| 73 | " | " " | 1 | " " " Stud Ram | 14 14 0 | |
| 29 | Ziervogel, F. | " " | 1 | Tasmanian-Merino Stud Ram | 18 18 0 | 27 6 0 |
| 51 | " | " " | 1 | " " Selected Flock Ram | 8 8 0 | |
| 30 | Lamb, J. | P.O. Box 21, Ermelo | 1 | " " Stud Ram | 11 11 0 | |
| 32 | " | " " | 1 | " " " " | 11 0 6 | |
| 37 | " | " " | 1 | " " Selected Flock Ram | 15 15 0 | |
| 43 | " | " " | 1 | " " " " " | 8 8 0 | |
| 50 | " | " " | 1 | " " " " " | 4 4 0 | 68 15 6 |
| 52 | " | " " | 1 | " " " " " | 9 9 0 | |
| 56 | " | " " | 1 | " " Flock Ram | 2 2 0 | |
| 57 | " | " " | 1 | " " " " | 3 3 0 | |
| 64 | " | " " | 1 | " " " " | 3 3 0 | |
| 31 | Hamilton, J. M. | Cedarmont, Standerton | 1 | " " Stud Ram | 42 0 0 | 42 0 0 |
| 33 | De Villiers, J. P. | P.O. Breyten | 1 | " " " " | 11 11 0 | 30 9 0 |
| 35 | " | " | 1 | " " " " | 18 18 0 | |
| 34 | Buhrmann, J. R. | Ermelo District | 1 | " " " " | 29 18 6 | 29 18 6 |
| 36 | Greig, D. C. | Stock Exchange, Johannesburg | 1 | " " Selected Flock Ram | 13 2 6 | 13 2 6 |
| 38 | Fourie, L. D. | Ermelo District | 1 | " " " *" " | 12 12 0 | 12 12 0 |
| 39 | Meyer, W. H. | Wittenburg, Piet Retief | 1 | " " " " " | 8 8 0 | |
| 47 | " | " " | 1 | " " " " " | 6 16 6 | |
| 49 | " | " " | 1 | " " " " " | 6 6 0 | |
| 55 | " | " " | 1 | " " Flock Ram | 7 17 6 | 36 15 0 |
| 60 | " | " " | 1 | " " " " | 4 14 6 | |
| 61 | " | " " | 1 | " " " " | 2 12 6 | |
| 40 | Van Jaarsveld, L. J. R. | Dordrecht, Cape Province | 1 | " " Selected Flock Ram | 15 4 6 | 15 4 6 |
| | | | | *Carried forward* | | £623 3 6 |

* Not catalogued.

| Lot No. | Name of Purchaser. | Address of Purchaser. | Particulars of Stock Purchased. | Price. | Total. |
|---|---|---|---|---|---|
| | | | | £ s. d. | £ s. d. |
| | | | *Brought forward*.......... | | 63 3 6 |
| 41 | Scheepers, H. F.......... | Sheepmoor, Ermelo District... | 1 Tasmanian-Merino Selected Flock Ram.......... | 19 8 6 | 19 8 6 |
| 42 | Farrar, Sir George........ | Niekerksvlei, Standerton...... | 1 ,, ,, ,, ,, ,, .......... | 18 18 0 | 18 18 0 |
| 44 | Schmahmann Bros........ | Dullstroom.................. | 1 ,, ,, ,, ,, ,, .......... | 3 13 6 | |
| 46 | ,, ....... | ,, .................. | 1 ,, ,, .. ,, ,, .......... | 4 4 0 | 13 2 6 |
| 48 | ,, ....... | ,, .................. | 1 ,, ,, ,, ,, .......... | 5 5 0 | |
| 45 | Mason, Judge............ | Standerton.................. | 1 ,, ,, ,, ,, .......... | 7 17 6 | 17 17 0 |
| 53 | ,, ............ | ,, .................. | 1 ,, ,, Flock Ram.................. | 9 19 6 | |
| 54 | Breytenbach, H. J........ | P.O. Breyten.................. | 1 ,, ,, ,, ,, .................. | 5 15 6 | |
| 59 | ,, ....... | ,, .................. | 1 ,, ,, ,, ,, .................. | 7 7 0 | 19 19 0 |
| 62 | ,, ....... | ,, .................. | 1 ,, ,, ,, ,, .................. | 3 13 6 | |
| 89 | ,, ....... | ,, .................. | 3 ,, ,, Ewes*...........@ 21/– each | 3 3 0 | |
| 58 | K. Rood................ | Beginderlyn, Ermelo.......... | 1 ,, ,, Flock Ram.................. | 1 11 6 | 11 11 0 |
| 63 | ,, ................ | ,, ,, .......... | 1 ,, ,, ,, ,, .................. | 9 19 6 | |
| 65 | Pet, J. W............... | Ermelo Town................ | 1 Wanganella-Rambouillet Stud Ram............. | 10 10 0 | 10 10 0 |
| 67 | Nel, P. H............... | ,, District.............. | 1 ,, ,, Selected Flock Ram..... | 10 10 0 | |
| 68 | ,, ............... | ,, ,, .............. | 1 ,, ,, ,, ,, ,, ..... | 12 12 0 | 32 0 6 |
| 72 | ,, ............... | ,, ,, .............. | 1 ,, ,, Stud Ram............ | 8 18 6 | |
| 74 | Smith Bros............... | Krantzpoort, Ermelo District . | 1 Suffolk Stud Ram.............................. | 4 4 0 | 8 8 0 |
| 77 | ,, ............... | ,, ,, ,, .. | 1 ,, ,, ,, .............................. | 4 4 0 | |
| 75 | Brink, C. C............. | ,, ,, ,, .. | 1 ,, ,, ,, .............................. | 4 4 0 | 9 9 0 |
| 76 | ,, ............. | ,, ,, ,, .. | 1 ,, ,, ,, .............................. | 5 5 0 | |
| 78 | Fairbairn & Wilson...... | Contractors, Ermelo.......... | 1 Fries Bull, "Willem of Ermelo"............. | 40 19 0 | 40 19 0 |
| 79 | Lourie, Beriolowitz....... | Krantzpoort, Ermelo District.. | 1 ,, ,, "Prins of Ermelo"................. | 33 12 0 | 33 12 0 |
| 80 | South African Wattles Co. | Bethal....................... | 1 ,, ,, "Louis of Ermelo"................. | 71 8 0 | 71 8 0 |
| 81 | Moodie, J............... | Balmoral..................... | 1 Aberdeen-Angus Bull, "Gordon".............. | 50 8 0 | 50 8 0 |
| 82 | Burnham Bros........... | P.O. Kinross................. | 1 ,, ,, ,, "Sir Nigel"............. | 84 0 0 | 84 0 0 |
| 83 | Bell, J. F............... | Sandfontein, Kinross.......... | 1 ,, ,, ,, "Montrose"............. | 89 5 0 | 89 5 0 |
| 90 | Rijfsnijder, J. C......... | Ermelo Town................ | 4 Ewes*..........................@ 10/6 each | 2 2 0 | 2 2 0 |

| | | | | | |
|---|---|---|---|---|---|
| 91 | Smith, S. P. | Unknown | 4 Ewes* @ 21/- each | 4 4 0 | 8 8 0 |
| 92 | ,, | ,, | 4 ,, * @ 21/- each | 4 4 0 | |
| 94 | Louw, C. R. | Ermelo Town | 3 ,, * @ 31/6 each | 4 14 6 | 4 14 6 |
| — | Sancroft-Baker, H. | Silverbank, Greylingstad | Fries Bull,* "Jan 2nd of Ermelo" | 61 19 0 | 61 19 0 |
| | | | | TOTAL... | £1231 2 6 |

* Not catalogued.

AVERAGES.

| | £ s. d. | | £ s. d. |
|---|---|---|---|
| Aberdeen-Angus Bulls | 74 11 0 | Wanganella-Rambouillet Rams (Standerton) | 8 8 0 |
| Fries Bulls | 51 19 6 | Wanganella and Tasmanian Rams (Ermelo) | 9 17 10 |
| Suffolk Rams (Standerton) | 4 9 3 | Ewes | 1 12 8 |

# Rural Notes.

## The Irrigation Congress.

The Third Annual Congress of the South African Irrigation Association opened at Graaff-Reinet on the 11th November, under the chairmanship of Sir Thomas Smartt, the President of the Association. The congress was well attended and thoroughly appreciated the instructive programme provided. Papers were read, followed by discussions, on the following subjects: Irrigation Engineering (by Mr. A. M. A. Struben, A.M.I.C.E.), The Drainage of Irrigated Land, with special reference to the problem of brak (by Mr. J. P. Marais, Wonderfontein, Robertson, Cape Province), Some Conditions Affecting Soil Fertility (by Dr. C. F. Juritz), Closer Settlement under Irrigation (by Mr. A. Elton Mills, Grootfontein School of Agriculture), and Irrigation by "Zaaidams" (by Mr. Carel J. van Zijl, Carnarvon, Cape Province). Excursions to representative farms were also arranged. One afternoon was occupied with an interesting visit to Mr. Walter Rubidge's farm, Dalham, where something like thirty or more motor-cars conveyed roughly 150 delegates. Dalham is an object lesson as to what can be done on the dry Karroo by means of irrigation. Graaff-Reinet stands in a basin surrounded by mountains, and through this basin runs the Sunday's River; this river, usually dry or almost so, carrying off the torrents of water that fall on the slopes of the hills and mountains during the rainy season. The water of a Karroo river in flood carries in solution some of the richest soil in the world, and its value for irrigation purposes can therefore be imagined. Only, the farmer must be ready to utilize the flood water just when it comes. This may mean rising in the middle of the night to open the sluice gates and allow a portion of the flood to run off on to his lands—being conveyed thither by means of an elaborate system of furrows and ditches.

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The system by means of which the flood water is utilized is interesting. A suitable point on the river, sufficiently high to allow the water to be conveyed by gravitation over the whole of the lands it is desired to irrigate, is selected, and a dam is thrown across the river-bed at this point. . This serves to deflect sufficient of the flood water for the farmer's requirements; and a large furrow, guarded by a strong sluice gate near the dam, and opening into smaller furrows along its course, carries the water to the various fields. To the visitor who is unacquainted with the system of flood irrigation practised in the Karroo, the silting up of the upper side of the dam, often up to the top of the wall, for a considerable stretch up the river-bed, appears to defeat the object of the dam, namely, to hold up the water. This impression is soon corrected when he learns that the silting up does not lessen the efficiency of the system, since the object of the dam is to raise the level of the water during a flood sufficiently to ensure a good flow through the sluice gate into the furrow. Consequently, whether

the upper portion of the bed is silted up or not does not matter, since the dam is not constructed for storage purposes. Indeed, it would seem that this silting up helps to remove from the dam wall the enormous strain of millions of tons of rushing water during the rains. The system is an interesting one, but its interest does not end here. We have said that the flood water of the Karroo river holds in solution some of the richest soil in the world. When the rains come the river descends in torrents, and the rich, chocolate-coloured flood is carried by means of the furrows out on to the fields where it soaks into the land. The silt which it carries in solution is left as a cake on the surface of the land and at the end of the season gets ploughed in. The result is that the Karroo farmer who is practising flood-water irrigation never thinks of fertilizers. He has, indeed, no use for them; the flood water he runs over his lands carries all the fertilizing constituents he requires, and in a form in which the crops can make early use of them.

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**"Dalham" and "Wellwood."**

Dalham lies on the outskirts of a richly fertile plain, which is either an ancient lake-bed, or, more probably, is formed from the washings from the slopes of the surrounding mountains and the flooding of the Sunday's River during the course of ages. In either case, the soil is rich; and the land being fairly level lends itself well to flood irrigation. Mr. Walter Rubidge runs ostriches and grows lucerne and corn, of which we saw many large fields. There are two dams across the river, which runs through the farm, from which the extent of Mr. Rubidge's operations may be judged. On the 13th we paid a private visit, in company with Mr. Scherffius, Chief of the Tobacco and Cotton Division, and Mr. Davis, Government Horticulturist, to Wellwood, the home of Mr. Richard Rubidge. Here we saw a different system of irrigation in vogue, namely, from storage dams. Mr. Richard Rubidge is off the Sunday's River, and for the purposes of irrigation he has constructed four large dams of the familiar veld type. These dams have a fine catchment area, in the shape of mountains and a valley above the farm, from which the water is brought to the dams by means of furrows. Here also we saw a fine old seedling orchard, sixty years of age, and the pride of the Graaff-Reinet District. We had the pleasure of sampling the oranges on some of these magnificent trees—some of which were 25 feet and more in height—and for size and flavour and comparative freedom from pips we have never before met with anything to compare with them in the seedling line. From this it must not be inferred that we would advocate the planting of seedlings; grafted trees like the Washington Navel and the Valencia Late yield greater returns and command a better market; but Mr. Rubidge is reaping the fruit of and carrying on his father's work, and his seedling grove as it stands to-day and in close proximity to the Graaff-Reinet market, which appears to be a no mean one, is a fine business proposition.

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The fine results which Mr. Rubidge is securing from his orange grove are, of course, due to an intelligent study of the requirements of citrus fruits. As the trees developed it was observed that they had been planted rather too closely to permit of their satisfactory growth, and

Mr. Rubidge has consequently taken out a number and transplanted them elsewhere. The results have been successful, both as regards the old grove and the transplants, which have taken root and are developing satisfactorily. Again, Mr. Rubidge irrigates his orchard, but in doing so he has been wise enough to avoid soaking the stems of his trees by running the water into basins around them. Such a practice ends in the development of collar rot, and to avoid this Mr. Rubidge has heaped up earth around the stems of the trees. For irrigation purposes the orchard is laid out in a series of rectangles, bounded by banks. Thus the water is able to soak well into the ground and reach the roots without affecting the trunks of the trees, since the earth heaped around them rises to the same height as the banks. Another object lesson was the efforts which Mr. Rubidge is successfully making to stem the course of erosion. This he is doing by the planting of lines of aloes transversely to the course of the furrows and dongas. We were shown one large flat piece of land, which next season is to go under crop, and which not long ago it was impossible to ride across on account of the serious erosion which had taken place during the course of many years. Now, as the result of planting line of aloes, the dongas have become silted up, and a piece of land which was a waste and a danger has become a fertile field which will be made to yield a profitable crop.

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**Visits to Other Farms.**

After a most satisfactory sitting at Graaff-Reinet the congress left by special train at half-past six on the morning of the 14th in the direction of Rosmead. The first stop, about nine o'clock, was made at Koloniesplaats, the farm of Mr. A. A. Kingwell. Here breakfast was served, and then, under the guidance of Mr. Kingwell, the party numbering thirty, began a tour of inspection. Mr. Kingwell is a progressive farmer, and we saw many evidences of his energy and industry. At Koloniesplaats irrigation by means of the flood-water system is carried on, and some fine dams have been erected for the purpose. There is, however, a small permanent stream on the farm, from which water is pumped up by means of a suction gas engine. Ostriches are Mr. Kingwell's principal mainstay, and we saw a considerable flock during the course of our tour of inspection. At about eleven o'clock the party rejoined the train, and the next stop, at two o'clock, was made at the fine little Karroo town of Middelburg. Here we were met by Mr. Thornton, and after lunch were taken out to the Grootfontein Experiment Farm. This institution was inspected with the greatest interest by the delegates. The first stop was made at the sheep and wool shed, and then the workshops were visisted. Here we saw a number of students at work, in charge of instructors, acquiring a knowledge of such useful accomplishments to the farmer as blacksmithing, carpentry and joinery, and some excellent specimens of students' work were exhibited to us. Next came the chemists' laboratory, the cow-byre (where milking, by the students, was in full swing, and where, *inter alia*, the visitors were much impressed by the herd of Frieslands, which they were unanimous in pronouncing as magnificent), the silos—built of reinforced concrete—a hay-stacking contrivance, the dairy, and the famous Barbary ostriches. A walk over an adjacent hill brought us to a large dam for irrigation purposes, and the site of another dam which it is proposed to construct and which

will bring a further considerable area of land under water, was pointed out to us. We now came upon an interesting operation—the construction of an enormous veld dam. The object of this dam is to check erosion; and a fine piece of work it is. Next we visited the lucerne variety fields and inspected a plot of spineless cactus which is being tried. This brought our tour to an end, as the hour was growing late, and soon we were landed in Middelburg, ready for dinner.

### The Work of the Association.

Thus ended a most instructive congress, upon the success of which the executive of the association are to be congratulated. The history of the association, during the three years it has been in existence, constitutes a record of hard up-hill work and dogged perseverance. It has, we think, been given to few organizations to accomplish so much with such a brief period as lies to the credit of the South African Irrigation Association. There has been no blowing of trumpets, yet the idea of the association has taken firm root. Why this should be is easily explained. The establishment of the association met a distinct need—an opportunity of exchanging and of placing upon record irrigation experience. It had no new principles to preach; and if it is doing any work of a propagandist nature it has an excellent basis for such work, for it has simply to point to what has actually been done in this country—the "logic of accomplished fact," as the genial secretary, Mr. F. D. MacDermott, himself would say. The association is still going ahead, and not simply in the increasing of its membership roll. Readers of the *Journal* are familiar with the scheme which the association has instituted for the purpose of encouraging irrigators to place upon record the actual results of their experiences. Essays are invited by the secretary (whose address, readers may be reminded, is P.O. Weenen, Natal), and if up to standard these are paid for by the association and published in the *Agricultural Journal.* At the recent congress it was also announced that the executive had decided to issue a year-book, which would include all the papers read at the annual gathering and the essays published in the *Journal.* Such an annual volume should be welcomed by irrigators, and will serve gradually to consolidate and to record the large amount of irrigation experiences in this country.

### Successful Dairy Students.

Some three years ago, on hearing of Miss J. C.ván Duyn's success in her studies and practical training in household science at the Macdonald College, Canada, and realizing the great need that exists for the training of girls and young women along similar lines in South Africa, Miss C. Dougall and Miss E. Hamilton left Pretoria for Canada with the intention of going through the teachers' full two years' course in domestic science at the Macdonald Institute of the Ontario Agricultural College, Guelph. These ladies completed the normal course of instruction and practical work in domestic science at that institution and were awarded the teacher's certificate in elementary domestic science. They then decided to study the science and practice of dairying, and accordingly entered the West of Scotland Agricultural College, Glasgow, thereafter proceeding to the College Dairy

Farm at Kilmarnock. They were successful in passing all the prescribed examinations, and later received the National Diploma in the Science and Practice of Dairying, this honour carrying with it the use of the letters N.D.D. Miss Dougall and Miss Hamilton have now undertaken a tour with the object of acquainting themselves as fully as possible with dairy methods and conditions in Canada, the United States, England, Denmark, and Holland, for which purpose they are visiting some of the leading dairies in those countries. Miss Dougall and Miss Hamilton are to be heartily congratulated upon their success and their enterprise.

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**Maize Contests for Boys.**

In the May, 1913, issue of the *Journal* we drew attention to the value of maize contests for boys, and suggested that some of our leading agricultural societies might care to take the matter up, exhibiting the results of the contest at their annual show. Readers will be interested to learn that, as a result of that note, Mr. Charles Graham Stone, of the Corner House, Johannesburg, has generously come forward with a donation of £100 to help on such scheme of maize contests as the Department of Agriculture may be able to recommend. The department has agreed to go into the matter and see whether a sound scheme could be put into operation next season; and further particulars will be published in due course.

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**Judging at Shows.**

Mr. H. E. King, Secretary of the South African National Union, writes as follows: In connection with this matter I beg to say that two of the "objects" of my society are (*a*) to urge the necessity for improvement and uniformity in quality, and for constancy in supply, of our products and manufactures, so as to fit them for competition with those from other parts of the world; (*b*) to aid the development of our rural areas, especially by popularizing the use of articles manufactured from our agricultural products, and to foster home industries of all kinds, both in town and country. It is to carry out these purposes that we have taken up the subject of judging in the women's sections, for oversea competition affects practically all classes of goods. It has been felt for a long time that there is need for improvement in the present methods of judging the "home" industries shown annually at our agricultural shows. At present, owing to the lack of uniformity in system, and the absence in many cases of trained judges, no educative results are really attained. Judging in all sections should be undertaken by persons with expert knowledge and it should be carried out everywhere on much the same lines. Moreover, exhibitors will not always be satisfied to compete in their own district only. Before these industries can assume commercial proportions the products must be able to compete on equal terms with similar articles in any part of the country. A definite standard at which exhibitors can aim is therefore essential. It is recognized that the sympathies of the agricultural societies throughout the country must be obtained so that action can be taken in a matter that we feel is all important in the development of "rural industries." A judges' association is about to be formed in the Transvaal. It is hoped that it will include a women's section and that

examinations for judges in that section will be instituted on the same lines as those obtaining in the Free State. Women themselves are asking for a knowledge of newer and better methods of household management, and one step in that direction is to raise the standard of judging at shows so that only the best articles will be produced, and produced on economic lines.

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The following letter has been addressed to each agricultural society in the Transvaal: "At several meetings of this society the question of judges' associations has been discussed. It is found that the Cape Province and the Orange Free State are the only places where such institutions exist at the present time. It seems to my society that such associations are essential in the interests of agriculture in order to maintain that high standard of judging at shows which is necessary to obtain the educative results which should be the main object of judging. It is hoped that before long this will be recognized throughout the Union. I understand that it is proposed to form a judges' association in the Transvaal at an early date, so I need not refer to the subject generally. But I am asked to suggest to you that when such an association is being formed a women's section should be added, as it is felt that there is as great a need for competent and standardized judging in the women's sections as under any other head. This has been recognized in the Orange Free State, by the formation of a women's section of the judges' association there, with the following objects: (1) To supply judges to those sections of agricultural shows which come within the sphere of domestic economy; (2) to organize lectures on cookery, household economy, household hygiene, gardening, poultry, bee-keeping, dairy management, needlework, and kindred subjects; (3) to collect and distribute intelligence bearing on the above subjects. It is not easy to see how Nos. 2 and 3 can be carried out everywhere, but that the first is absolutely necessary, and of urgent importance, is generally admitted. Women's work must be, and often is, of the same high order of merit as exhibits in other classes, but owing to an absence of uniformity in classification and method of judging there is no fixed standard of quality at which to aim and on which exhibits should be judged. It is thought that in view of the necessity for encouraging home industries and of making them of commercial value, which is the ultimate object, the system of judging should be standardized throughout each Province at least and probably throughout the Union. I beg to ask whether in view of what has been stated you will support the formation of a women's section in the judges' association about to be formed in the Transvaal."

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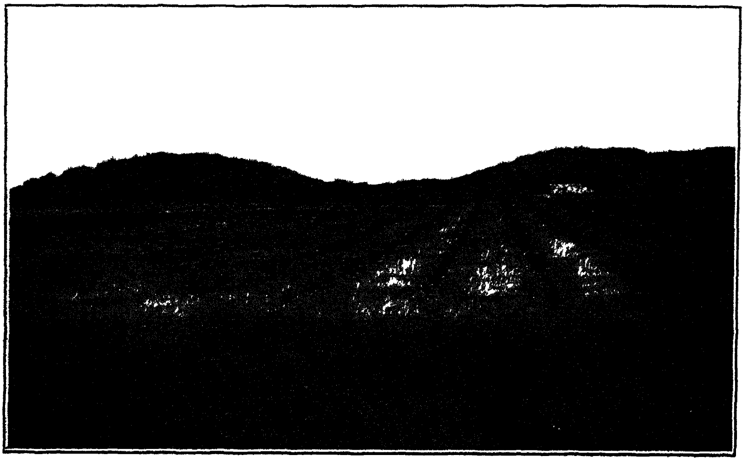
**A Useful Vermin Club.**

The second annual general meeting of the Darling Hunt Club was held in the Town Hall, Darling, on the 11th November, 1913. There was a good attendance of members. The honorary secretary's report showed that this club was formed in 1912 amongst the farmers in the Darling District for the purpose of the extermination of vermin by means of hounds. At the outset ten hounds were acquired, but the number has since been increased by purchase and breeding to thirty-two. Owing, however, to some of this number being too young to hunt with yet, and to an outbreak of biliary fever amongst the others, the

bulk of the past season's work was done by eight hounds. The report of the huntsman, Mr. J. H. Rex, showed that during the past season the kills amounted to the very considerable total of sixty jackals and



Fortunes in the Making

A Settler's Homestead.

thirty-one cats, besides about two dozen other vermin During the previous season, 1912, forty jackals were accounted for, besides a large number of other vermin. The treasurer's statement showed that, after meeting all liabilities for the past season, there was a balance to the

credit of the club of about £50. The following officers were elected for the ensuing season: Master, Mr. W. F. Versfeld, of Glen William. Deputy-Master, Mr. N. J. Basson, of Zwartwater. Honorary Secretary and Treasurer, Mr. C. Merrington, of Darling. Huntsman, Mr. J. H. Rex. Committee, Messrs. J. Louw, J. A. Basson, F. H. Duckitt, and M. J. de Villiers.

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**Fortunes in the Making.**

Now that such widespread interest is being taken in fruit growing, and especially in connection with the citrus portion thereof, attention will not be lacking in such a state of affairs as the accompanying illustrations depict. The orchard shown is the property of Messrs. Currie, Linton & Byng, situated near Karino Station, on the Delagoa Bay line, a short distance beyond Nelspruit, Transvaal. It consists of oranges, naartjes, and lemons; there are some 2500 trees all told, running from one to three years of age, and all are doing well. The rondavels give an idea of the cheap, convenient, and comfortable temporary house of the owners, and will make way when the trees come into full bearing for substantially built brick houses.

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**"White Liver" in Sheep.**

The Veterinary Division will be glad to get in touch with any stock owners whose sheep are affected with the disease known as "white liver." This disease is suspected to be due to vegetable poisoning and has been reported to have caused several losses in the Winburg District, Orange Free State. Inquiries already addressed to farmers whose animals were reported to be dying have elicited responses to the effect that deaths have now ceased, but if any losses are still occurring the department would like to have an opportunity of going further into the matter.

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**New Books.**

SOUTH AFRICAN SHEEP AND WOOL. By W. W. McKee, Government Sheep and Wool Expert, Department of Agriculture, Cape Province, Union of South Africa; Member of the Hawkesbury Agricultural College, New South Wales; Gold and Silver Medallist. (Capetown: T. Maskew Miller, 1913.)

In issuing a book on sheep and wool in South African conditions Mr. McKee has filled a distinct want. The dimensions of the wool industry in South Africa, the increase in the production of that commodity, the steadily growing realization of the need for improvement in the quality and the conditions of marketing, render the appearance of such a comprehensive work as Mr. McKee's most opportune at the present time. This work is the first authoritative publication we have had on sheep husbandry in all its phases specially written for the needs of the South Africa pastoralist; and the author's knowledge of his subject, together with the opportunities he has had as a Government sheep and wool expert for studying sheep farming in our greatly varying conditions, eminently fit him for the task he has undertaken. Mr. McKee's work is the result of many requests from farmers and

others to publish a work on South African sheep and wool, but he purposely deferred undertaking such a work in order that time and experience might crystallize, modify, or reject opinions formed during the early part of ten years' residence in South Africa. Now, however, that he has undertaken the preparation of such a book, he has covered his subject in a comprehensive and at the same time concise manner. Dealing first with the history of sheep in South Africa and the history of the Merino sheep, he proceeds to discuss breeding, which, in its various branches, occupies three chapters of the book. Then comes a discussion on wool and its preparation for market, and this is followed by hints on preparing sheep for show and judging. The feeding of sheep during drought is next dealt with, and the matter of shelter occupies a whole chapter. Another chapter deals with fencing, power shearing, sheep yards, and dipping tanks; and contains useful breeding table, shearing table reckoner, and particulars of antidotes for poisons. A chapter is devoted to the manufacturing side of the wool industry, in order that farmers may gain some idea of the uses to which wool is put, and of the processes wool undergoes before it is brought to the finished article. As showing the practical value to farmers of a chapter such as this, it may be observed that, in preparing wool correctly for market the main object is to assist wool sorters in working and manipulating the wool in the quickest, cheapest, as well as the most expeditious manner possible, thus saving a certain amount of unnecessary handling. Extra hands have to be employed if the wool is badly "got-up," which, on the other hand, would not be necessary if the wool were properly prepared. This is a most important point for South Africa, as all extra expense to which the manufacturer or sorter is put must be charged for—and the producer has to pay. No work on sheep farming would be complete without a discussion of the principal British breeds, and this is a point Mr. McKee does not overlook. He goes further, however, and gives a brief but most useful history of the Australian flocks whose progeny are to be found in South Africa, such as the Wanganella, Burrundella, Ercildoune, Scone, etc.; and—for the first time, we believe—we are presented with an account of some of the leading South African flocks. The final chapter of the book is taken up with a discussion of the diseases in sheep and goats prevalent in South Africa; and a useful index brings the work to a close. Mr. McKee is to be congratulated upon producing a sound, practical book, written in a concise style suited to the needs of the busy man—a book that is bound to find favour among the sheep men of South Africa.

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DRY-FARMING. By Heinrich S. du Toit, Government Dry-Land Agronomist for the Union of South Africa. (Potchefstroom: "Het Westen" Printing Works, 1913. 3s. 6d.)

Mr. Du Toit's book (of which a Dutch edition was issued some time ago) may be described as a chatty discussion of an increasingly popular subject. The book is a small one, consisting of but five chapters, but these five divisions are closely packed with useful information to the dry farmer. The main heads of the book are a history of dry farming, the soil, the "dry" of dry farming—what is meant by dry farming, the conservation of soil moisture, and dry farming possibilities in South Africa. Mr. Du Toit treats his subject in a popular style, and his book may be recommended to any one who wishes to obtain a working knowledge of the principles of dry farming.

MANUAL OF THE PRACTICE OF VETERINARY MEDICINE. By Edward Courtenay, M.R.C.V.S. Third edition. Revised by Frederick T. G. Hobday, F.R.C.V.S., F.R.S.E.I. (London: Balliere, Tindall & Cox, 1913. 10s. 6d.)

Courtenay's "Veterinary Medicine" is too well known to need any introduction to veterinary students and practitioners. That a third edition should be called for is evidence in itself of the fact that the work has been appreciated. Nowadays it is impossible to deal thoroughly in a single volume with every aspect embraced under the heading of veterinary science, but "Courtenay" serves as a short comprehensive résumé invaluable to the student and the young practitioner. In the present edition numerous illustrations have been inserted, which greatly enhance the value of the text.

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**Miscellaneous Notes.**

A communication has been received from England advising that the Board of Agriculture anticipates that the proposed quarantine testing station for cattle destined for South Africa will be ready for use in about three months' time.

It is announced that in May, 1916, the Fifth International Congress of Rice Culture will be held at Valencia (Spain). The Department of Agriculture is prepared to give credentials to any South African irrigation farmers who may be travelling in Europe about that time and who may desire to attend the congress. Correspondence regarding the congress may be addressed to the Commissionare Royal de Fomento, Plaza San Luis Beltran, Valencia, Spain.

THE LOCUST CAMPAIGN.—Mr. Claude Fuller, Acting Chief of the Division of Entomology, reports as follows to the Secretary for Agriculture:—The following extract from a telegraphic report received from Mr. Wahl is submitted for your information: Schoombie, 19th November, 2.45 p.m. "Thomson visited farms Rosmead and Schoombie yesterday. Country north of line clear and good work done. Have again visited farms Tafelburg and Schoombie. Hoppers in hand everywhere, but many fliers; not all brown locusts. Estimate 80 per cent. locusts which have hatched have been destroyed." In amplification, I have to state that there has been a considerable hatching in the district of a non-migratory locust much resembling the migratory in appearance. This species has come to maturity, and its winged form is mistaken for the plague locusts. The latter species is expected to reach maturity from now on and the campaign will be practically closed in the course of the next six to eight days.

PEACH PITS.—There is frequently a demand for pits of the common yellow peach from nurserymen and others. In order to facilitate distribution on the one hand and to assist nurserymen to procure what they require on the other, it is suggested that any one with peach pits of the class mentioned for sale should notify the Chief, Division of Horticulture, Pretoria, to that effect. The stones from dried peaches should find a ready sale, provided that they are not allowed to remain out in the sun but placed in heaps under a shady tree.

# Notes from the Schools of Agriculture.

## POTCHEFSTROOM.

*October.*—The station was favoured on the 4th of October by a visit from the Right Honourable the Prime Minister, who was accompanied by Mrs. Botha and Miss Botha, Mayor of Potchefstroom, and others. The party was met by Mr. Alex. Holm, Under-Secretary for Agriculture, and Mr. E. J. Macmillan, Principal of the School, and escorted through the different departments of the institution. Mr. B. Enslin, Chief, Sheep and Wool Division, was also present.

A sheep dipping tank recently completed, according to plans issued by the Chief of the Sheep Division, was given a trial test on the occasion of this visit.

On the 6th the Hon. H. S. Theron, Minister of Lands, paid the farm a short visit.

Mr. P. A. Hayman, until recently manager of farms for the Kroonstad Collieries at Vierfontein, has been appointed farm manager.

Exceptional rains fell from the 11th to the 13th October, 4.75 inches being recorded. The prospects of the seeding of spring crops are very promising, and pasturage is greatly improved. Fruit promises to be a full crop; a light frost occurred on the 3rd, but no damage was done. Cherries are already ripe.

*November.*—Since the last monthly report was issued the station had received a visit from the Empire Parliamentary Association, comprising a party of twenty-five, and including members of the British Parliament and their wives. They were accompanied from Pretoria by the Secretary for Agriculture. A full morning was spent in looking over the school and farm. The visitors exhibited great interest in everything, particularly in such distinctive South African features as ostrich rearing, cattle dipping, and the breeding of Afrikander cattle.

A special visit was made by a committee of members of the South African Union on the 1st instant. Mr. Holm, Under-Secretary, conducted this party.

We were very glad to receive the assistance of Mr. Smith, of the Grootfontein School of Agriculture, in lectures given on the ostrich industry. Mr. Smith's instruction was much appreciated.

Several members of the staff attended and took part in the proceedings of the Dry-farming Congress held in Johannesburg on the 5th and 6th instant.

The lecturer in engineering was present at the Irrigation Congress which opened on the 11th November at Graaff-Reinet.

The annual sale was held on the 12th November. About four hundred persons attended. The numbers of stock offered were slightly in excess of last year. The animals were of good average quality, though perhaps few exhibited exceptional merit. A parade of breeding and sale stock was held at 10 o'clock, and the auction began at eleven with poultry, followed by pigs, both classes bringing average prices. The major portion of the stock was reserved for the afternoon. The thoroughbred colts did not sell as readily as in former years, and the offers for Ayrshires were low, otherwise very satisfactory prices were

realized. The demand for donkey jacks in particular was very keen, Jack No. 7 topping the sale at 180 guineas. The gross receipts amounted to £3666. 9s. 3d.

Harvesting began on the 13th. Maize planting is being steadily pushed forward. Little rain has been received during the period under report, but as the result of previous heavy rains, the moisture conditions continue favourable.

The diploma examination will begin on 3rd December, and it is expected that the closing exercises with presentation of diplomas will take place on the 19th December.

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## ELSENBURG.

*October.*—The principal, some members of the staff, and students partook of an excursion to Elgin, in the Caledon District. The farms of Dr. Viljoen and of Messrs. Molteno Bros. were visited. In the former instance many excellent object lessons were provided particularly in fruit growing, wine-making, and forestry, while in the latter case much was learned regarding the growing of potatoes on a commercial basis. Some interesting facts regarding the establishment of clover and of various grasses were obtained. The excursion proved to be most instructive and was greatly appreciated.

At Elsenburg the prospects are for a good yield of fruit. The orchard was sprayed and the vineyard topped and sulphured. During the month another 50 acres of land were brakked, bringing the total up to 200 acres.

The rainfall for the month was 2.32 inches, the maximum temperature 89.1, and the minimum 40.9.

The Elsenburg flock of sheep was shorn and the wool sorted by senior students under the supervision of the Government wool expert. Senior students also received a special course of instruction in the testing of milk according to the Babcock and Gerber methods.

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## GROOTFONTEIN.

Mr. A. Stead writes: Arrangements are now well in hand for the thorough equipment of our laboratory so that by the New Year we should be in a position to undertake agricultural analyses for farmers residing in the district served by the college. In the meantime correspondence is invited.

*Arsenical Poisoning.*—We have recently found arsenic in considerable quantities in the stomach of a dead animal which had been grazing over an area sprayed with arsenite mixture to destroy voetgangers. Had the owner known of an antidote he might have possibly saved his animal. The best antidote for arsenical poisoning is freshly precipitated ferric hydrate. This can be prepared by mixing chemically equivalent quantities of solutions of ammonia and ferric chloride. Such solutions can be prepared and obtained from almost any dispensing chemist. Any farmer who uses arsenical preparations would be well advised to keep such solutions on hand. The ferric hydrate must be freshly prepared. It acts by combining with the arsenic to form a compound which is not acted on by the digestive juices, and one which, therefore, does not poison.

*Brak and Lucerne.*—A sample of soil taken from one of several typical spots in a lucerne field, has been received for analysis with the complaint that lucerne would not grow in these places. The result of the analysis reveals the presence of large quantities of soluble salts, including salts of magnesia, which are perhaps the most poisonous of all "brak" salts. Lucerne when young is very sensitive indeed to certain kinds of "brak." Failures to establish the crop may, therefore, be due to the presence of "brak." The analysis of the soil in such cases may throw light on the reason for failure.

*Lamziekte.*—Before these lines are in print it is hoped that certain feeding experiments will be in progress here. Sheep and cattle will be fed solely on diets somewhat similar to those that have produced beri-beri and similar diseases in small animals such as monkeys, fowls, pigeons, rats, dogs, etc. Pigeons will also be fed on a beri-beri producing diet, but other lots will also receive biltong—some of the biltong made from karree-reared cattle—and others a biltong made from lamziekte cattle. If beri-beri and lamziekte are related diseases, one would expect karroo biltong to be more efficacious in preventing beri-beri than lamziekte biltong, which is assumed to be deficient in beri-beri vitamine. It is also intended to prepare yeast extracts and extracts from horse flesh, ganna, etc., as soon as the necessary apparatus arrives. The extracts will be administered to sick animals and also to healthy animals with a view to testing any curative or preventive properties they may possess.

## CEDARA.

November is a very busy month in Natal, as it is the chief planting season. We are busy planting our mealies and harvesting the forage, some good yields of the latter having been obtained. Fine results from oats and hairy vetch are reported.

The students are busy preparing for their examinations.

There is a steady demand for young pedigree pigs. Sheep shearing was finished early in the month.

*Extension Work.*—Three lectures were delivered at Rosetta, three at Mooi River, two at Weenen, and one each at Stanger and Umhlali.

Intending students who desire to enter the agricultural schools at the beginning of the next term are advised to make immediate application. There are still a few vacancies at the Cedara, Elsenburg, and Grootfontein schools, but the applications for admittance to the Potchefstroom school are already in excess of the accommodation available.

Applications in respect of the three above-named institutions should be addressed to the Principal, School of Agriculture, Cedara, Natal; Elsenburg, Mulder's Vlei, Cape Province; and Grootfontein, Middelburg, Cape Province.

# Correspondence.

This section is set aside for correspondence on all subjects affecting the Farming Industries of the Union of South Africa and cognate matters; and, while every reasonable latitude will be allowed, contributors are requested to be as concise and succinct as possible in the expression of their views.

Suggestions for practical consideration and discussion, and hints as to improved methods applicable to any branch of agriculture, are particularly welcome.

It must at all times be distinctly understood that the Department of Agriculture is in no sense responsible for the views and opinions expressed in this section.

All communications should be clearly addressed "The Editor of the *Agricultural Journal*, Department of Agriculture, Pretoria," and written on one side of the paper only.

## IS SOUTH AFRICA DRYING UP?

To the Editor of the *Agricultural Journal.*

SIR,—With reference to the above query, and in answer to Mr. Chase's letter, I think that the answer to the above will be found in the extensive denudation of timber in, at any rate, this part of the Union, and, more particularly of late years, in the Protectorate.

If you question very old natives, they will tell you that, before the advent of the white man, they were blessed with copious and timely showers, but that since the white man came amongst them the rainfall has lessened, until now it is merely nominal. Of course I refer more particularly to British Bechuanaland. Since Kimberley was opened up, thousands of loads of wood have been cut here in the Vryburg District, and any one wandering over the Kaapsche Berg will find still the roots of giant kameel trees which were chopped down years ago to fill the insatiable man of Kimberley. That is a story of the past, at least two decades ago, but now let us turn to the present. Any one standing on Vryburg platform can see, daily, numbers of bogie-loads of poles and firewood coming down from the north, and this has been going on since the railway to the north was opened, to wit, since 1897, nearly sixteen years! Imagine for one minute how many acres of land have been deforested, and this is not done to improve the land and make it ready for the plough, but merely to put money into the grasping hand of greedy alien speculators. To give you a small instance of the wilful waste of our national resources: In 1897, Magalapye, a station in the Protectorate, was embowered in trees, and was a peaceful picture. In 1901 I passed it in the train, and had to ask where we were, so shockingly was this beauteous spot altered. It was an arid plain, with scarcely a tree to be seen.

Now, Sir, it is of little use to say that, because the Protectorate is 500 miles off, this does not affect our rainfall. I say that it does, and it behoves our Agricultural Department to remonstrate, and that pretty strongly, against this awful waste that is going on. This is not a country where trees grow easily. I myself have planted thousands, and only succeeded in raising a few, and my trees were well looked after. Only the other day a man was urging me to buy ground up-country. "Why," he said, "you could pay for it with the wood you could cut off it, in two years' time!"

Nature is a stern taskmaster; while very generous, she exacts a terrible price for misdeeds, and as surely as they are chopping acres of trees in the Protectorate, so surely will we, and our children, aye, and our children's children, have to pay a terrible price. At present we are suffering for the misdeeds of former days; to-morrow we will be paying for the misdeeds of to-day. These speculators do not care a snap for the consequences of their actions: so long as it puts money in their pockets all is well. It is we farmers who must eventually pay the piper.

From drought comes sickness of all kinds, and, at the rate at which wood is being cut up alone, this country must soon revert to a desert. Just imagine how much ground is covered by one bogie-load of poles alone, and these are straight poles, and it is a fact that it is not every tree that is straight, so how many acres must be cut in order to supply one bogie-load of straight trees? Then there is the crooked wood, all neatly sawn and packed

in other trucks; and this must give food for thought to all intelligent men. What is to be the end of it? If this letter will cause even ten men to ponder over this terrible waste of forestry, then it will not have been written in vain.—Yours, etc.,

SIDNEY C. SMITH.

Vryburg.

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To the Editor of the *Agricultural Journal.*

SIR,—The *Agricultural Journal* is certainly one of the most useful and instructive productions in South Africa. Most of us, even if not farmers, have some hobby or other, and, whatever one's hobby, every one can find something useful for himself; and if one does not fully comprehend any suggestion or recommendation, he is invited to ask for explanation or enlightment. I have no hobby now. I am, nevertheless, a reader of the *Journal*, and occasionally I find something that elicits a little thought. In the correspondence section of the October issue a matter of great importance is touched upon by Mr. R. B. Chase, of 246 Clark Road, Durban. Mr. Chase, briefly, gives his idea of the decrease of the rainfall in South Africa. It is not my intention to try and prove that Mr. Chase is right or wrong, but I venture to show a few facts which will not quite coincide with his reason for the decrease of the rainfall. My age is well over three-score years, and I think (also having been born in South Africa) I may justly claim to have studied the conditions of and changes which have taken place in the country during, at least, the last forty years. It is quite true that the rainfall has decreased very considerably within that time, especially within the last twenty-five years, and every thinking man would like to know the reason therefor and to improve the conditions, if within his power. The subject is, therefore, one well worth studying. From time to time I have seen reasons given for this "change for the worse," but I cannot remember ever having seen anything convincing. Mr. Chase ascribes this "change for the worse" to the disappearance of the herds of game with which South Africa was once overrun. His theory is that these animals were fond of "mud-baths," and that thousands of pools or hollows were formed by the animals rolling, one after another, in certain spots where little pools existed; that these pools were filled during rainy seasons; that by percolation or soaking in of the water from these many pools springs were formed, evaporation caused, and hence great rainfalls. Mr. Chase calls upon old residents to bear him out in this theory, at any rate as far as the existence of these pools is concerned. I am not one of the oldest residents in South Africa, but can claim the experience of a good many years, as I have shown. I came to the Free Street just verging on forty years ago. I have shot thousands of head of game (blesbuck, springbuck, and wildebeest), and, if Mr. Chase is right, it is surprising that I have never succeeded in shooting a *single head with mud on, nor have I ever seen one looking dirty or muddy.* On the contrary, I have always seen them perfectly clean and free from mud.

It is correct that there are many pans in South Africa, especially in the Free State, and particularly in the Districts of Kroonstad, Winburg, and Hoopstad. There are also smaller hollows and small pans, but it is pure speculation as to how they were caused. It has been contended that the pans (large and small) in these districts were caused by upheavals of the earth; that they are, as likely as not, the craters of extinct volcanoes, or that, when the earth was cooling down or settling, these hollows were caused by some movements of the earth. Many years ago a man tried to convince me that the pans were caused exactly in the manner that Mr. Chase accounts for the many pools. The thousands of pools alluded to by Mr. Chase I have never come across. If the millions of game really caused the many pools it seems quite reasonable to contend that the pans also were formed in the same manner or process. Mr. Chase does not include this idea in his theory, but I think he may, with a certain show of reason, do so.

I have spoken to a large number of old hunters, and no one has ever shot, or seen, game covered with mud, except elephants, and I do not think it can be or is contended that the prairies or grass flats of the Free State were inhabited by elephants. Though I am not "in authority" I am desirous of knowing a little more of Mr. Chase's ideas on so important a matter, and, possibly, it may lead to some good purpose.—Yours, etc.,

JAS. P. VAN ZIJL.

P.O. Box 44, Theunissen.

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To the Editor of the *Agricultural Journal.*

SIR,—In the October issue of the *Journal* Mr. Chase gives his theory regarding the deterioration of the climate of South Africa during the last twenty-five years. He says this is caused by the scarcity of game; that they no longer make pools which can hold water. I think that ten times as much water is caught up in dams to-day than was held in the pools twenty-five years ago.

I think the cause is quite another one. Is it not perhaps that the windmills and other machines exhaust the water in the earth, so that no moisture is left in the ground, and thus no evaporation, which causes rain? I think this is quite evident.—Yours, etc.,

D. PRETORIUS.

## CULTIVATION OF BUCHU.

To the Editor of the *Agricultural Journal*.

SIR,—Will you kindly answer a few questions for me *re* the cultivation of the buchu plant?

(1) Where could I get the seed? (2) what is the best kind to get? (3) what soils are most suitable for its growth? (4) what is the best method of curing, packing, etc.? (5) where are the best markets? (6) what length of time does it take to grow, from planting to first picking? (7) at what age can it be picked? (8) does it lose its aroma as common tea by exposure? (9) can it stand much moisture? (10) how many years can it be picked before replanting?

It is such a profitable plant that I would certainly like to go in for its cultivation on a fairly large scale.—Yours, etc.,

C. J. BALL.

The Ledges, Oliviershoek, Natal.

[The Lecturer in Botany, School of Agriculture, Elsenburg (Mr. J. H. Neethling), replied:—In regard to the propagation of the buchu plant, it must be mentioned that this matter, though important, is still in a state of infancy. This Department has taken this matter up this year, but the seedlings are very sensitive, and very subject to insect trouble. However, some of the plants are now growing after having been transplanted, in spite of unfavourable weather conditions. As Mr. G. R. van Wielligh has had this plant under his observation, and has experimented as regards cultural methods, I might state that our present knowledge is embodied in his article on "The Culture of the Buchu Plant" in the July number of the *Agricultural Journal*, 1913. It must be borne in mind that this plant has, as yet, as far as I can ascertain, not been cultivated on a commercial scale for a sufficient number of years to allow of any definite conclusions regarding its culture. However, I hope to be able to report more fully at a later date, especially regarding the work done at this station, but as yet this matter does not allow of publication. Regarding the questions asked by Mr. C. J. Ball, I shall answer such as are not dealt with in the article referred to above. (1) Seed may be obtained from the Government Forester, Clanwilliam, though, as he has informed me, it will be difficult to gather any large quantity. Perhaps Mr. F. J. Versfeld, Moutonsvlei, Piquetberg, might be able to supply a small quantity. (2) The best variety to obtain appears to be the *Barosma betulina*. (5) Messrs. Spillhaus & Co., Strand Street, Capetown, are handling the cured product. (6) At earliest the first picking can be done in the third year from the seed, though this depends naturally on the vigour of the plants, and I have seen it stated that only in the fourth or fifth year the leaves can be gathered. This of course does not mean that the leaves of seedlings do not contain the volatile oil, but by gathering the leaves of too young plants the plants may be set back so much as to make the practice unprofitable. (7) See answer to 6. (10) I have seen no reference to this matter, but I believe that it may be taken that the buchu plant is fairly long-lived.]

## CITRUS-GROWING ON THE MAGALIESBERG.

To the Editor of the *Agricultural Journal*.

SIR,—I have read with interest the letter signed "E" in last issue of your valued *Journal*. I could have wished the writer had sufficient confidence in himself to sign his name. No good can come of these light-and-shadow arguments, but I shall endeavour to correct what was evidently a printer's error.

When interviewed I stated that land planted to citrus had sold up to £1000 per morgen in California. If "E" will call on me I will show him the printed proofs in support of the statement. The price of £8 to £10 land in South Africa should have read for "bare lands," and there is an abundance of it to be got at that price under "fontein" water.

I never yet advocated planting citrus under "fontein" water, for I have always considered it suicidal. The orange is a long-lived tree, and "fontein" water may give out any day. I know one man now confidently planting 2000 trees under water barely

sufficient to keep them alive; in fact he has to pipe it from tree to tree. How he expects to water them when, say, ten years old, I know not. That sort of fruit-growing is born of ignorance pure and simple. I recently warned a man not to buy a place planted under "fontein" water, even though it had done well for many years, but he paid £10 (arable and grazing included) a morgen for it. If I mistake not he will live to regret his purchase. I think there is no safety in planting citrus on any land that is not watered by a permanent river, so far as the Transvaal is concerned. Many orange-growers on "fontein" water have been ruined during the past two years. Fountains that have run for fifty years dried out completely, but I do not know of trouble experienced by any growers on the rivers.

As to the profits made, which "E" quibbles at, I can prove this from my own small grove. It is not difficult. If "E" grows oranges properly and markets them in the right way he would never have questioned that part of my interview. I maintain that any man going into the orange-growing business with any brains at all has a fortune ahead of him, provided he is willing to work hard and has sufficient capital as a standby until his trees come into bearing, and if he carries out the following conditions:—

(1) He must plant under assured river-water, on the right soil, and attend to his trees properly.
(2) He must grow the right varieties.
(3) He must market properly—that is, graded, wrapped, and boxed.

Several growers under the mountain have consistently got 12s. 9d. to 15s. per 100 for their fruit all the present season, but it was graded, boxed, and wrapped, while others just picked the fruit, dropped it into baskets, and sent it to open morning market, and were rewarded with anything from 2s. to 5s.

If a grower will carry out the three conditions I have stated, then I unhesitatingly say that he has a fortune ahead of him, and I stake my knowledge against that of "E," whoever he may be. I am well known, and not afraid to sign my statements. In support of my claim let me quote from the lecture recently given by Mr. Davis, the Government Horticulturist, than whom no better authority exists regarding the citrus business in South Africa. In the November issue of the *Journal* he says: "The finest citrus trees he had seen in his life were some grown in the Transvaal, from which the grower made £3 per tree." As 300 trees can be grown on a morgen of land, it follows that the particular grower in question realized at the rate of £900 per morgen per annum.

Thanking you in anticipation of the insertion of the foregoing,—Yours, etc.,

W. A. JONNES.

P.O. Brits.

# The Weather.

By C. STEWART, B.Sc., Chief Meteorologist, Department of Irrigation.

THE mean air temperature over the Union during the month of October was about one degree below the normal. In the north of the Transvaal both the days and nights were warmer than usual; whilst along the coastal districts of the Cape the days were warmer and the nights cooler. Over the greater part of the country, however, the general tendency was towards the sub-normal during the whole twenty-four hours.

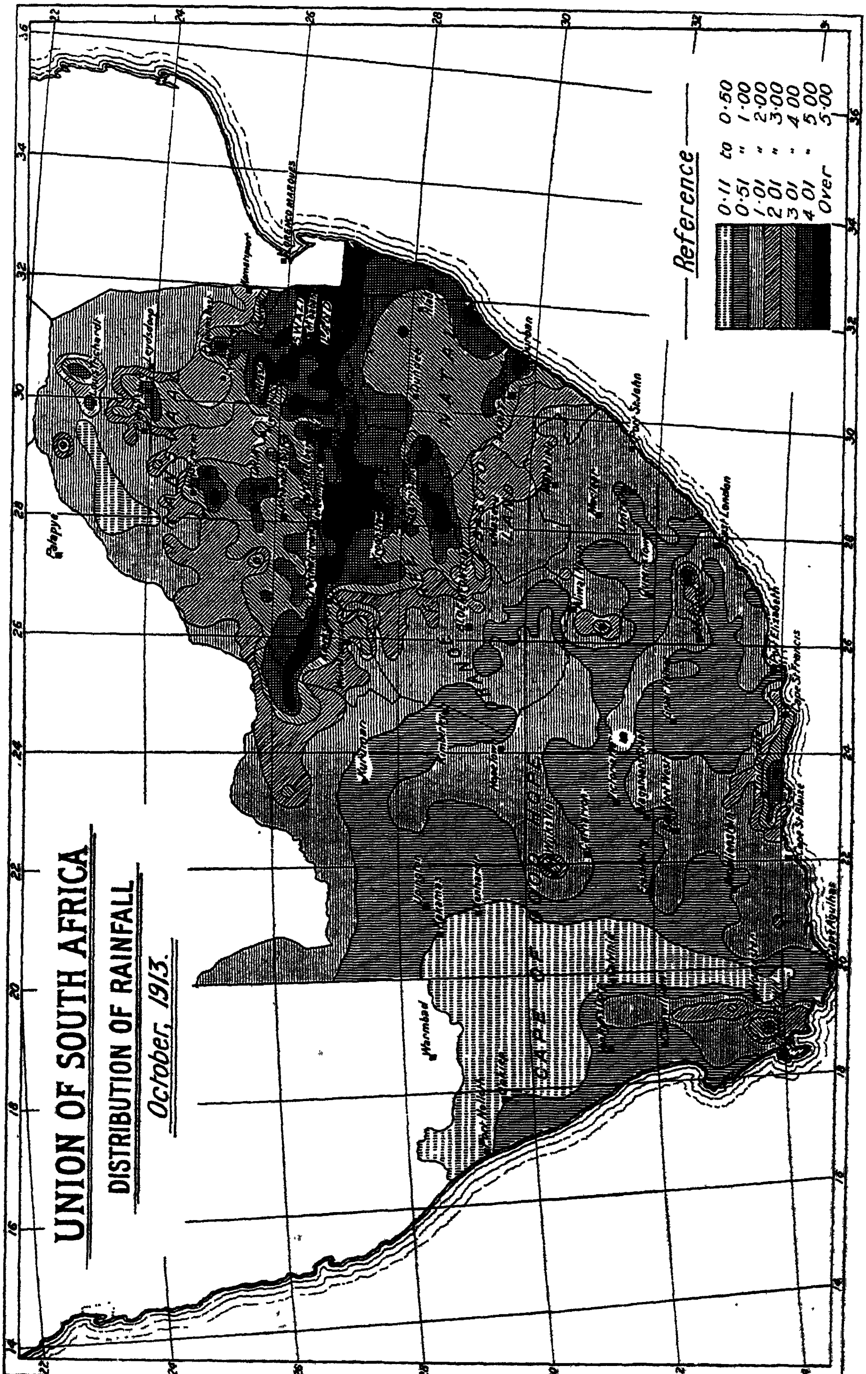
Excepting in the south-east of the Union the rainfall was in excess of the average, and the reports received show that a more optimistic spirit than has been evident for some considerable time past is now pervading the agricultural districts. In the north of the Orange Free State and in the Transvaal good steady rains fell towards the middle of the month, and in these parts the total for the month was considerably above the normal. Over the inland portion of the Cape rain fell on the 9th only. The year's rainfall (from 1st January, 1913) is now above the average, except in the Orange Free State, the extreme east and the south of the Transvaal, and in the north-east, over the northern borders, and in the west of the Cape.

OBSERVATIONS OF TEMPERATURES (FROM SELF-REGISTERING THERMOMETERS IN THERMOMETER SCREENS)—OCTOBER, 1913.

| PLACE. | OBSERVER. | MONTH—OCTOBER, 1913 | | | Normal Monthly Temperature. | Difference from Normal. | EXTREMES. | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean Max. | Mean Min. | Monthly Temperature. | | | Highest. | Date. | Lowest. | Date. |
| | | ° | ° | ° | ° | ° | ° | | ° | |
| *Transvaal*—Louis Trichardt ... ... | Sergt. H. D'Arcy ... | 79·2 | 56·5 | 67·9 | 67·2 | +0·7 | 97·0 | 24th | 47·0 | 17th. |
| Pietersburg ... ... | F. W. Frankleyne ... | 83·9 | 54·0 | 69·0 | 66·9 | +2·1 | 95·5 | 23rd | 41·0 | 15th. |
| Zeerust ... ... | H. Dietrich, J.P. ... | 82·1 | 52·2 | 67·1 | 69·0 | —1·9 | 92·7 | 5th | 36·4 | 2nd. |
| Pretoria (Arcadia) ... | J. Lyall Soutter ... | 80·9 | 51·9 | 66·4 | 67·6 | —1·2 | 91·0 | 5th | 39·0 | 1st. |
| Belfast ... ... | E. F. Schmidt ... | 67·8 | 42·0 | 54·9 | 58·1 | —3·2 | 80·0 | 23rd | 29·0 | 1st. |
| Mbabane (Swaziland). | Swaziland Police ... | 74·4 | 52·4 | 63·4 | 63·3 | +0·1 | 89·0 | 3rd | 40·0 | 17th. |
| Johannesburg (Obser.) | Staff ... ... | 72·2 | 51·1 | 61·7 | 61·4 | +0·3 | 80·9 | 11th | 41·0 | 16th. |
| Potchefstroom ... | J. R. Stenning ... | 80·4 | 50·7 | 65·5 | 64·8 | +0·7 | 88·3 | 22nd | 34·3 | 1st. |
| Komatipoort ... ... | H. J. Evans ... | 87·3 | 62·4 | 74·9 | 76·0 | —1·1 | 103·5 | 3rd & 6th | 53·0 | 18th. |
| *Free State*—Bloemfontein ... ... | J. Arndt ... ... | 75·9 | 48·9 | 62·4 | 63·3 | —0·9 | 87·7 | 28th | 36·3 | 24th. |
| Lindley ... ... | J. Oats ... ... | 75·5 | 46·0 | 60·8 | 61·6 | —0·8 | 83·5 | 28th | 33·5 | 1st. |
| Harrismith ... ... | J. B. Patterson ... | 68·6 | 44·3 | 56·5 | 59·7 | —3·2 | 78·0 | 5th | 31·0 | 1st. |
| *Natal*—Durban ... ... | Capt. Black ... | 69·6 | 61·5 | 65·6 | — | — | 75·0 | 29th | 54·0 | 24th. |
| Maritzburg ... ... | Govt. Asylum ... | 77·1 | 52·8 | 64·9 | 67·4 | —2·5 | 96·0 | 29th | 43·0 | 24th. |
| Dundee ... ... | T. Kenny ... ... | 77·6 | 51·5 | 64·6 | 66·8 | —2·2 | 90·0 | 3rd | 45·0 | 12th & 16th. |
| Hlabisa ... ... | J. Swarbrick ... | 77·6 | 59·1 | 68·4 | 66·6 | +1·8 | 93·0 | 3rd | 51·0 | 11th. |
| *Cape*—Kuruman ... ... | G. Bean ... ... | 81·1 | 46·6 | 63·9 | — | — | 92·0 | 28th | 34·0 | 1st, 2nd, & 5th |
| O'okiep ... ... | J. Crofts ... ... | 74·8 | — | — | — | — | 95·0 | 17th | — | — |
| Hopetown ... ... | C. B. Scott ... ... | 78·7 | 48·3 | 63·5 | 66·4 | —2·9 | 88·8 | 17th | 38·4 | 1st. |
| Aliwal North ... ... | A. Brown ... ... | 76·0 | 43·0 | 59·5 | 61·0 | —1·5 | 87·0 | 29th | 33·0 | 1st. |
| Kokstad ... ... | H. D. Coyte ... | 70·4 | 45·1 | 57·7 | 58·0 | —0·3 | 87·0 | 29th | 32·5 | 1st. |
| Murraysburg ... ... | A. Cameron ... | 74·5 | 42·8 | 58·6 | 59·1 | —0·5 | 89·0 | 17th | 30·0 | 23rd. |
| Queenstown ... ... | H. Holley ... ... | 74·7 | 47·0 | 60·8 | 62·2 | —1·4 | 88·0 | 17th | 32·0 | 24th. |
| Bedford ... ... | T. J. Hall ... ... | 74·3 | 46·8 | 60·5 | 61·6 | —1·1 | 94·0 | 17th | 34·0 | 24th. |
| East London ... ... | M. G. Grogan ... | 70·5 | 56·9 | 63·7 | 63·8 | —0·1 | 77·0 | 11th & 30th | 48·0 | 1st. |
| Amalienstein ... ... | Rev. Carl Prozesky | 77·6 | 48·1 | 62·9 | 63·6 | —0·7 | 101·0 | 17th | 40·0 | 24th. |
| Groot Drakenstein ... | Lionel Baker ... | 73·1 | 50·4 | 61·8 | 61·1 | +0·7 | 96·4 | 16th | 41·4 | 24th. |
| Capetown (Observatory) | The Staff ... ... | 69·5 | 52·5 | 61·0 | 60·7 | +0·3 | 86·9 | 16th | 45·6 | 3rd. |
| Wynberg ... ... | Sister Mary Imelda | 68·4 | 47·8 | 58·1 | 59·8 | —1·7 | 83·5 | 15th | 41·0 | 4th. |
| Mossel Bay ... ... | G. Draper ... ... | 69·7 | 50·8 | 60·3 | 61·4 | —1·1 | 90·0 | 17th | 42·0 | 24th. |
| Port Elizabeth ... | P. E. Morgan ... | 69·7 | 53·9 | 61·8 | 62·0 | —0·2 | 85·0 | 25th | 46·0 | 24th. |
| *Bechuanaland*—Mochudi ... ... | W. A. Harbor ... | 88·7 | 56·5 | 72·6 | — | — | 101·0 | 23rd | 37·0 | 1st. |

## RAINFALL RETURN FOR OCTOBER, 1913.

| PLACE. | OBSERVER. | MONTH. | | | YEAR. | | |
|---|---|---|---|---|---|---|---|
| | | Oct., 1913. | Normal. | Difference from Normal. | From 1st Jan., 1913. | Normal. | Difference from Normal. |
| | | ins. | ins. | ins. | ins. | ins. | ins. |
| *Transvaal—* | | | | | | | |
| Komatipoort ... | H. J. Evans ... | 2·72 | 1·89 | +0·83 | 18·25 | 19·07 | —0·82 |
| Pilgrims Rest ... | E. Elphinstone ... | 3·24 | 2·15 | +1·09 | 29·99 | 30·03 | —0·04 |
| Belfast ... ... | E. F. Schmidt ... | 4·77 | 3·17 | +1·60 | 22·65 | 21·08 | +1·57 |
| Zeerust ... ... | H. Dietrich, J.P. | 3·06 | 1·66 | +2·40 | 18·10 | 17·67 | +0·43 |
| Middelburg ... | Dr. H. A. Spencer | 3·21 | 2·65 | +0·56 | 16·12 | 18·64 | —2·52 |
| Pretoria (Arcadia) | J. Lyall Soutter... | 4·40 | 2·68 | +1·72 | 23·26 | 20·44 | +2·82 |
| Standerton ... | A. von Backstrom | 5·08 | 3·33 | +1·75 | 22·30 | 21·41 | +0·89 |
| Pietpotgietersrust | S. A. M. R. ... | 2·22 | 1·57 | +0·65 | 20·42 | 15·87 | +4·55 |
| Johannesburg ... | Observatory Staff | 4·59 | 2·78 | +1·81 | 18·54 | 20·89 | —2·35 |
| Louis Trichardt ... | S. A. M. R. ... | 3·90 | 2·30 | +1·60 | 22·52 | 21·46 | +1·06 |
| Pietersburg ... | W. Frankleyne ... | 1·19 | 1·96 | +0·77 | 16·02 | 13·82 | +2·20 |
| Rooiberg ... ... | N. H. Munro ... | 2·42 | 1·36 | +1·06 | 15·31 | 16·28 | —0·97 |
| *Swaziland—* | | | | | | | |
| Mbabane... ... | Swaziland Police | 6·06 | 4·45 | +1·61 | 37·04 | 35·67 | +1·37 |
| *Natal—* | | | | | | | |
| Durban ... ... | Capt. Black ... | 5·06 | 4·94 | +0·12 | 52·17 | 30·88 | +21·29 |
| Maritzburg ... | Govt. Asylum ... | 4·10 | 2·70 | +1·40 | 37·37 | 21·74 | +15·63 |
| Hlabisa ... ... | J. Swarbrick ... | 6·04 | 5·11 | +0·93 | 45·89 | 27·76 | +18·13 |
| Dundee ... ... | T. Kenny ... | 3·40 | 3·69 | —0·29 | 23·67 | 23·58 | +0·09 |
| *Cape—* | | | | | | | |
| Mochudi ... ... | W. A. Harbor ... | 1·17 | 1·76 | —0·59 | 8·90 | 12·96 | —4·06 |
| Mafeking ... | J. G. Levis ... | 4·59 | 1·64 | +2·95 | 17·56 | 15·42 | +2·14 |
| Vryburg ... | G. H. Portwy ... | 2·13 | 0·84 | +1·29 | 14·49 | 20·85 | —6·36 |
| Griquatown ... | E. Hanstein ... | 1·48 | 0·91 | +0·57 | 15·51 | 12·01 | +3·50 |
| Prieska ... ... | R. A. Roberts ... | 1·46 | 0·67 | +0·79 | 9·96 | 8·67 | +1·29 |
| Kimberley ... | R. J. Leisk ... | 0·54 | 1·19 | —0·65 | 13·36 | 14·31 | —0·95 |
| Hopetown ... | C. B. Scott ... | 1·58 | 0·85 | +0·73 | 12·28 | 11·16 | +1·12 |
| Clanwilliam ... | W. J. Downes ... | 0·85 | 0·64 | +0·21 | 9·21 | 8·08 | +1·13 |
| Van Rhynsdorp ... | T. J. Shaw ... | 0·57 | 0·43 | +0·14 | 5·64 | 5·92 | —0·28 |
| Calvinia ... | Gaoler ... | 1·15 | 0·53 | +0·62 | 6·18 | 7·32 | —1·14 |
| Fraserburg ... | P. J. Booyzen ... | 0·00 | 0·39 | —0·39 | 7·98 | 6·27 | +1·71 |
| Britstown ... | P. A. Myburgh ... | 0·77 | 1·04 | —0·27 | 11·01 | 9·65 | +1·36 |
| Carnarvon ... | J. Sullivan ... | 1·55 | 0·52 | +0·63 | 7·25 | 7·60 | —0·35 |
| Victoria West ... | N. van Rensburg | 0·94 | 0·67 | +0·27 | 11·62 | 9·25 | +2·37 |
| Murraysburg ... | A. Cameron ... | 1·10 | 0·70 | +0·40 | 9·46 | 9·73 | —0·27 |
| Philipstown ... | P.W. van Ingen-Kal | 3·50 | 0·80 | +2·70 | 10·31 | 11·70 | +4·61 |
| Hanover ... ... | B. Collette ... | 1·01 | 0·88 | +0·13 | 11·37 | 12·49 | —1·12 |
| Aliwal North ... | Gaoler ... | 1·40 | 1·60 | —0·20 | 14·94 | 19·99 | —5·05 |
| Queenstown ... | H. Holley ... | 0·89 | 1·67 | —0·78 | 22·36 | 18·89 | +3·47 |
| Kokstad ... | H. D. Coyte ... | 1·17 | 2·09 | —0·92 | 25·78 | 19·26 | +6·52 |
| Umtata ... | E. R. Hampson ... | 0·62 | 2·50 | —1·88 | 21·02 | 19·47 | +1·55 |
| Port St. Johns ... | F. W. Lloyd ... | 1·91 | 5·84 | —3·93 | 54·34 | 35·83 | +18·51 |
| Worcester ... | W. B. Sutton ... | 0·37 | 0·86 | —0·49 | 12·67 | 9·96 | +2·71 |
| Capetown Observ. | The Staff... ... | 1·50 | 1·85 | —0·35 | 20·73 | 24·95 | —4·22 |
| Wynberg ... | Sister Mary Imelda | 3·55 | 2·99 | +0·56 | 38·01 | 39·25 | —1·24 |
| Sutherland ... | Gaoler ... | 0·72 | 0·70 | +0·02 | 6·30 | 8·80 | —2·50 |
| Amalienstein ... | Rev. Carl Prozcsky | 1·06 | 1·26 | —0·20 | 9·60 | 10·98 | —1·38 |
| Swellendam ... | H. Montgomery... | 1·13 | 2·95 | —1·82 | 21·61 | 27·23 | —5·62 |
| Mossel Bay ... | G. Draper ... | 1·44 | 1·50 | —0·06 | 13·04 | 14·44 | —1·40 |
| Beaufort West ... | J. E. Stevens ... | 1·20 | 0·54 | +0·66 | 11·40 | 6·83 | +4·57 |
| Uniondale ... | E. J. Stewart ... | 1·82 | 1·02 | +0·80 | 15·01 | 12·03 | +2·98 |
| Knysna ... ... | C. Wilding ... | 2·47 | 2·33 | +0·14 | 23·28 | 22·62 | +0·66 |
| Graaff-Reinet ... | J. Simpson ... | 0·56 | 1·25 | —0·69 | 16·45 | 13·00 | +3·45 |


UNION OF SOUTH AFRICA
DISTRIBUTION OF RAINFALL
October, 1913.
Reference
0·11 to 0·50
0·51 " 1·00
1·01 " 2·00
2·01 " 3·00
3·01 " 4·00
4·01 " 5·00
Over 5·00

| PLACE. | OBSERVER. | MONTH. Oct., 1913. | MONTH. Normal. | MONTH. Difference from Normal. | YEAR. From 1st Jan. 1913. | YEAR. Normal. | YEAR. Difference from Normal. |
|---|---|---|---|---|---|---|---|
| | | ins. | ins. | ins. | ins. | ins. | ins. |
| *Cape* (continued)— | | | | | | | |
| Steytlerville ... | P. R. de Wet ... | 1·15 | 0·82 | +0·33 | 14·76 | 7·27 | +7·49 |
| Port Elizabeth ... | P. E. Morgan ... | 1·95 | 1·70 | +0·25 | 21·81 | 16·58 | +5·23 |
| Bedford ... | T. C. Hall ... | 1·30 | 2·52 | —1·22 | 23·58 | 21·57 | +2·01 |
| East London ... | M. G. Grogan ... | 1·36 | 2·42 | —1·06 | 29·94 | 19·76 | +10·18 |
| Van Wyk's Vlei... | J. R. Morkel ... | 1·10 | 0·36 | +0·74 | 5·58 | 5·55 | +0·03 |
| *Orange Free State*— | | | | | | | |
| Harrismith ... | J. B. Patterson ... | 5·98 | 2·62 | +3·36 | 19·92 | 20·64 | —0·72 |
| Bloemfontein ... | J. Arndt ... ... | 1·26 | 1·64 | —0·38 | 14·05 | 17·83 | —3·78 |
| Lindley ... | J. Oates ... | 3·57 | 1·81 | +1·76 | 15·58 | 18·45 | —2·87 |

## JANUARY WEATHER CHARACTERISTICS.

Except along the West Coast, where the minimum of 0·14 inches is reached, and in the south-western districts of the Cape, the rainfall is now increasing. Over the eastern half of the Union the precipitation is usually at its maximum during January. Swaziland and Basutoland, the latter with a normal of about 7·0 inches, are the districts where the heaviest rain may be expected. About 5·5 inches should fall in the Transvaal, 5·0 inches in Natal, 4·5 inches in Kaffraria and over the north-east of the Cape, 4·0 inches in the Orange Free State and over the south-east of the Cape, 2·5 inches over the Cape northern border, 2·0 inches over the northern and east central Karroo and along the south coast, 1·5 inches over the northern Karoo, and less than an inch over the remainder of the Union.

The highest mean daily temperature is still experienced over the northern borders of the Cape Province, where the normal remains at 77 degrees; and the eastern Transvaal follows with 75 degrees; the southern Karroo with 74 degrees; the east Central Karroo and the Orange Free State with 72 degrees; Natal, the south-east and the south-west of the Cape, and the northern Karroo with 71 degrees; Basutoland, the central Karroo, and the Cape western coast with 70 degrees; the south coast and the north-east of the Cape and the Transvaal high veld with 69 degrees, and then Kaffraria and the Cape Peninsula with 68 degrees. On the high veld generally the temperature is now at its maximum.

The prevailing winds are from the east in the Transvaal, from the north-north-west over the northern borders, and from the north-east and south-west in the south-east of the Cape.

In the Transvaal about 56 per cent., on the Peninsula about 76 per cent., over the Cape northern border about 74 per cent., and in the south-east of the Cape about 48 per cent. of the total possible hours of bright sunshine should be enjoyed.

# South African Produce Markets.

## CAPETOWN.

The Produce Department of the firm of R. Müller, Capetown, reports under date of the 29th November, as follows :—

*Ostrich Feathers.*—For 1914 the London ostrich feather auction sales have been fixed as follows, viz.:—

2nd February: Parcels received in London up to 27th December, 1913.
30th March: Last day of receiving parcels in London, 21st February, 1914.
25th May: Parcels received in London up to 18th April.
27th July: Last receiving day in London, 20th June.
6th October: Last receiving day in London, 22nd August.
30th November: Parcels received in London not later than 24th October.

For the sale which is to be held in London on the 2nd February, 1914, shipments from Capetown have to be made on or before the 6th December account.

Large quantities of mostly good quality have been disposed of in the Capetown market since I reported last on the 30th ult. The prices for all kinds of feathers have been satisfactory and altogether in favour of sellers, as is clearly shown by the following quotations:—

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| Primes........... | 18 | 0 | 0 | to | 37 | 10 | 0 |
| First ............ | 9 | 10 | 0 | „ | 17 | 10 | 0 |
| Second whites ..... | 7 | 0 | 0 | „ | 9 | 0 | 0 |
| Third whites ..... | 4 | 10 | 0 | „ | 6 | 10 | 0 |
| Inferior and stalky whites ........ | 2 | 10 | 0 | „ | 4 | 0 | 0 |
| Byocks and fancy | 3 | 0 | 0 | „ | 10 | 0 | 0 |
| Superior feminas.. | 10 | 0 | 0 | „ | 14 | 0 | 0 |
| First feminas ..... | 8 | 0 | 0 | „ | 9 | 10 | 0 |
| Second feminas ... | 4 | 10 | 0 | „ | 7 | 10 | 0 |
| Third feminas .... | 2 | 10 | 0 | „ | 4 | 10 | 0 |
| Greys ........... | 3 | 10 | 0 | „ | 9 | 10 | 0 |
| White boos ...... | 1 | 7 | 6 | „ | 3 | 5 | 0 |
| Light boos ....... | 1 | 0 | 0 | „ | 2 | 5 | 0 |
| Dark boos........ | 0 | 15 | 0 | „ | 1 | 5 | 0 |
| Inferior boos and tipless ........ | 0 | 2 | 6 | „ | 1 | 5 | 0 |

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| Long blacks ... ... | 3 | 0 | 0 | to | 5 | 0 | 0 |
| Medium blacks .... | 1 | 10 | 0 | „ | 2 | 10 | 0 |
| Short blacks ...... | 0 | 5 | 0 | „ | 1 | 0 | 0 |
| Long floss blacks... | 1 | 5 | 0 | „ | 2 | 0 | 0 |
| Medium floss blacks | 0 | 15 | 0 | „ | 1 | 5 | 0 |
| Short floss blacks... | 0 | 7 | 6 | „ | 0 | 15 | 0 |
| Long drabs........ | 2 | 10 | 0 | „ | 4 | 0 | 0 |
| Medium drabs ..... | 0 | 15 | 0 | „ | 2 | 0 | 0 |
| Short drabs........ | 0 | 5 | 0 | „ | 0 | 12 | 6 |
| Long floss drabs.... | 1 | 10 | 0 | „ | 2 | 0 | 0 |
| Medium floss drabs | 0 | 17 | 6 | „ | 1 | 5 | 0 |
| Short floss drabs ... | 0 | 5 | 0 | „ | 0 | 12 | 6 |
| Inferior long blacks and drabs ....... | 1 | 5 | 0 | „ | 2 | 10 | 0 |
| Common blacks and drabs .......... | 0 | 2 | 0 | „ | 0 | 5 | 0 |
| Spadonas ......... | 0 | 12 | 6 | „ | 4 | 10 | 0 |

*Wool.*—Wool sales are now being held in London. The cable reports hitherto received state that, at the opening of the sales, 9400 bales were offered, whereof only 500 bales from the Cape. Contrary to expectation the attendance was large and competition proved animated. Thus far, sales were effected from par to 5 per cent. decline. This refers to wool of all and any origin, including that from the Cape.

Only small quantities of wool have changed hands in Capetown partly for reason that sellers gave limits which exporters did not feel justified in paying. Anyhow, there exists a fair competition in the Capetown market, which guarantees that prices will, at all times, be paid which should satisfy producers.

The following are the prices now ruling at Capetown, viz.:—

| | d. | | d. |
|---|---|---|---|
| Calvinia, long.................. | 7 | to | 7¾ |
| Calvinia, medium .............. | 6 | „ | 7 |
| Karroo and Roggeveld........... | 6½ | „ | 10½ |
| Short burry wools, heavy........ | 4 | „ | 4¾ |
| Short burry wools, light......... | 4¾ | „ | 5½ |
| C and C., best grease........... | 6¾ | „ | 7¼ |
| C. and C., medium ............. | 6 | to | 6¾ |
| C. and C., inferior ............. | 5 | „ | 6 |
| White coarse.................... | 7 | „ | 8 |
| Short Hopefield and Piquetberg.. | 7 | „ | 8 |
| Short Malmesbury ............. | 8 | „ | 9½ |

*Skins.*—At the auction sales held in London towards the end of last month 420,693 Cape sheep skins were offered, of which 261,555 found purchasers. Prices remained unchanged for longs and extra longs. Eastern Province skins receded by one-eighth to 1d. Mediums and shorts remained unchanged and partly advanced ¼d. to ½d. Coarse varieties proved steady. Out of a total of 162,639 common Cape glovers' skins, 80,461 were sold.

The Capetown exporters readily bought all the consignments which arrived here, which in quality and quantity were about the average.

The following are the present ruling prices in Capetown:—

| | | |
|---|---|---|
| Goatskins, light | 13d. | per lb. |
| Goatskins, heavy | 11d. | „ |
| Sundried and lambs | 8d. | „ |
| Angoras | 7½d. | „ |
| Angoras, bastards | 10d. | „ |
| Angoras, shorn | 5½d. | „ |
| Caledon | 7½d. | „ |
| Longwool, Karroo | 6½d. | per lb. |
| Shortwool, Karroo | 5d. | „ |
| Pelts and damaged | 4½d. | „ |
| Capes, large | 3s. 3d. | each. |
| Capes, medium | 2s. 6d. | „ |
| Capes, cut | 1s. 6d. | „ |
| Damaged and kids | 7d. | „ |

*Hides.*—The Capetown market remains steady and thus very satisfactory. Without any difficulty parcels of any size can be sold to exporters at 11d. per lb. for sound heavy hides, and at 8d. per lb. for damaged hides.

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## PORT ELIZABETH.

Messrs. John Daverin & Co. report as follows under date 29th November, 1913:—

*Ostrich Feathers.*—A considerable amount of business has been put through on the local feather market since the date of our last report, the total value passing the hammer during the month was just about £125,000. The weight of this quantity was about 2500 lb., which makes an average price of 50s. per. lb. all round.

Prices for some descriptions are slightly lower than those ruling during October, but other descriptions show some improvement.

The market during the latter part of the month has been dull, prices occasionally being decidedly in favour of buyers, while at times, more particularly when good quality pluckings were under disposal the bidding was animated, and the prices realized very satisfactory.

In general, whites must be considered as from 5 to 10 per cent. above October prices, and the same remarks apply to long blacks, which are at present lower in price than they have been for a very long time.

Feminas, on the other hand, show no decline, dark feminas being, if anything, rather firmer. Spadonas are unchanged, the quantity of this description being very limited at present.

In body goods, drabs are slightly easier than they were, but are still fetching high prices as compared with blacks. Tails generally have hardened again, and are now selling well. The demand for broken and damaged body goods continues, and these descriptions command very full rates.

The London sales open on the 1st of December, and in the absence of any improvement in the trade, it is generally expected that a still further drop in prices will take place, but how this will affect the market at this side remains to be seen.

Our local sales will close on 17th December until 5th January, 1914.

We quote the following as current prices for:—

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| *Primes:* | | | | | | | |
| Extra super | 16 | 0 | 0 | to | 25 | 0 | 0 |
| Good | 13 | 0 | 0 | „ | 15 | 0 | 0 |
| *Whites:* | | | | | | | |
| Good to super | 9 | 0 | 0 | „ | 12 | 0 | 0 |
| Good average | 7 | 5 | 0 | „ | 8 | 10 | 0 |
| Average | 5 | 15 | 0 | „ | 7 | 0 | 0 |
| Common and narrow | 3 | 0 | 0 | „ | 5 | 0 | 0 |
| Good broken | 6 | 10 | 0 | „ | 9 | 10 | 0 |
| Thirds | 2 | 0 | 0 | „ | 4 | 0 | 0 |
| *Fancies:* | | | | | | | |
| Good | 6 | 10 | 0 | „ | 8 | 0 | 0 |
| Ordinary | 4 | 10 | 0 | „ | 5 | 10 | 0 |
| *Feminas:* | | | | | | | |
| Super | 9 | 0 | 0 | „ | 12 | 0 | 0 |
| Good average | 6 | 10 | 0 | „ | 8 | 0 | 0 |
| Average | 4 | 0 | 0 | „ | 5 | 10 | 0 |
| Common and narrow | 2 | 5 | 0 | „ | 3 | 5 | 0 |
| Good broken | 5 | 0 | 0 | „ | 7 | 10 | 0 |
| Thirds | 1 | 10 | 0 | „ | 2 | 10 | 0 |
| *Greys:* | | | | | | | |
| Good | 5 | 10 | 0 | „ | 7 | 10 | 0 |
| Ordinary | 3 | 10 | 0 | „ | 4 | 15 | 0 |

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| *Tails:* | | | | | | | |
| Male, good, big, bold | 2 | 0 | 0 | to | 3 | 5 | 0 |
| Male, good average | 1 | 10 | 0 | „ | 2 | 5 | 0 |
| Short and narrow | 0 | 15 | 0 | „ | 1 | 5 | 0 |
| Female, light, good, big, bold | 1 | 15 | 0 | „ | 2 | 10 | 0 |
| Female, light, good average | 1 | 5 | 0 | „ | 1 | 10 | 0 |
| Female, light, short and narrow | 0 | 10 | 0 | „ | 0 | 12 | 6 |
| Female, dark, good, big, bold | 1 | 0 | 0 | „ | 1 | 15 | 0 |
| Female, dark, good average | 0 | 15 | 0 | „ | 1 | 0 | 0 |
| Female, dark, short and narrow | 0 | 7 | 6 | „ | 0 | 10 | 0 |
| *Blacks:* | | | | | | | |
| Long (special) | 4 | 0 | 0 | „ | 5 | 5 | 0 |
| Long, good | 2 | 15 | 0 | „ | 3 | 5 | 0 |
| Long, fair | 1 | 15 | 0 | „ | 2 | 5 | 0 |
| Long, drabby | 1 | 0 | 0 | „ | 2 | 5 | 0 |
| Medium | 1 | 5 | 0 | „ | 2 | 0 | 0 |
| Short | 0 | 10 | 0 | „ | 0 | 15 | 0 |

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| *Blacks* (contd.): | | | | | | | |
| Wiry | 0 | 3 | 0 | to | 0 | 6 | 0 |
| Floss, long | 1 | 5 | 0 | „ | 1 | 15 | 0 |
| Floss, short | 0 | 10 | 0 | „ | 0 | 16 | 0 |
| *Drabs:* | | | | | | | |
| Long, special | 3 | 10 | 0 | „ | 4 | 10 | 0 |
| Long, good | 2 | 5 | 0 | „ | 2 | 15 | 0 |
| Long, fair | 1 | 10 | 0 | „ | 2 | 0 | 0 |
| Medium | 0 | 17 | 6 | „ | 1 | 15 | 0 |
| Short | 0 | 5 | 0 | „ | 0 | 12 | 6 |

| | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| *Drabs* (contd.): | | | | | | | |
| Wiry | 0 | 3 | 0 | to | 0 | 6 | 0 |
| Floss, long | 1 | 5 | 0 | „ | 2 | 0 | 0 |
| Floss, short | 0 | 9 | 0 | „ | 0 | 14 | 0 |
| *Spadonas:* | | | | | | | |
| Light (special) | 2 | 15 | 0 | „ | 4 | 0 | 0 |
| Light, fair to good | 1 | 10 | 0 | „ | 2 | 0 | 0 |
| Light, narrow | 0 | 15 | 0 | „ | 1 | 5 | 0 |
| Dark | 0 | 15 | 0 | „ | 2 | 0 | 0 |
| *Chicks* | 0 | 2 | 6 | „ | 0 | 7 | 6 |

The following may be quoted as the approximate current values of unsorted parcels per line:—

| | *Whites.* | | | | | | | *Feminas.* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | £ | s. | d. | | £ | s. | d. | £ | s. | d. | | £ | s. | d. |
| Superior pluckings | 8 | 0 | 0 | to | 9 | 10 | 0 | 6 | 10 | 0 | to | 8 | 0 | 0 |
| Good average lots | 6 | 5 | 0 | „ | 7 | 0 | 0 | 5 | 0 | 0 | „ | 6 | 0 | 0 |
| Poor average lots | 5 | 0 | 0 | „ | 5 | 15 | 0 | 3 | 5 | 0 | „ | 4 | 5 | 0 |
| Common lots, stalky, narrow, and discoloured | 3 | 15 | 0 | „ | 4 | 10 | 0 | 2 | 10 | 0 | „ | 3 | 0 | 0 |

| | *Tails.* | | | | | *Blacks.* | | | | | *Drabs.* | | | | | *Spadonas.* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | s. | d. | | s. | d. | s. | d. | | s. | d. | s. | d. | | s. | d. | s. | d. | | s. | d. |
| Good | 20 | 0 | to | 30 | 0 | 20 | 0 | to | 40 | 0 | 17 | 6 | to | 30 | 0 | 35 | 0 | to | 55 | 0 |
| Average | 12 | 6 | „ | 15 | 0 | 12 | 6 | „ | 17 | 6 | 12 | 6 | „ | 15 | 0 | 27 | 6 | „ | 32 | 6 |
| Poor | 7 | 6 | „ | 10 | 0 | 7 | 6 | „ | 10 | 0 | 7 | 6 | „ | 9 | 0 | 15 | 0 | „ | 22 | 6 |

It will be understood that for special lots these quotations may be exceeded.

*Wool.*—Since last addressing you on this subject the market generally has been interesting.

Early in the month buyers began to receive returns upon their early purchases which have proved rather disappointing.

The early wools were eagerly bought up at extreme prices and rates paid were considerably above London parity, and it was only reasonable to expect a safer level to prevail when yields became known and quantities increased, on the other hand, many influences have been playing upon the woollen trade. The marked falling off in sales in yarns and pieces, also the forward selling of tops at cheaper rates and not forgetting the dearness of money.

Locally the market has been irregular—most buyers prefer catalogue sale buying to out of hand.

Competition for well got up light conditioned clips has been good, and we quote these to-day about ¼d. to ½d. below ruling prices at the beginning of the month.

Heavy, faulty wools of uncertain yields are most difficult of sale, and only bring very low bids, and in many instances passed without offer.

Coarse and coloured and crossbred wools are lower, 6½d. for the former and ½d. lower than previously ruling for the latter.

Basuto grease, in sympathy with other descriptions, is quoted at 6¾d. to 7d. for fair quality and condition shorts.

The London wool sales opened on the 25th November. Opening cables report—"5 per cent. decline on previous series."

| | d. | | d. |
|---|---|---|---|
| Snow-white, extra superior | 22 | to | 23 |
| „ superior | 21 | „ | 22 |
| „ good to superior | 20 | „ | 21 |
| „ inferior faulty | 17 | „ | 19 |
| Grease, super long, well-conditioned, grassveld grown (special clips) | 10½ | „ | 11½ |
| Grease, super long, grassveld grown | 9 | „ | 9½ |
| Grease, super long, Karroo grown (special clips) | 9½ | „ | 10 |
| Grease, super long, Karroo grown | 8 | „ | 9 |
| Grease, super long, mixed veld | 7¼ | „ | 8 |
| Grease, light, faultless, medium, grassveld grown | 8 | „ | 9 |
| Grease, light, faultless, medium, Karroo grown | 7½ | „ | 8 |

| | d. | | d. |
|---|---|---|---|
| Grease, light, faultless, short, Karroo grown | 7 | to | 8 |
| Grease, short, very wasty | 5½ | „ | 6 |
| Cross-bred grease | 6¾ | „ | 7¾ |
| Cross-bred scoured | 14 | „ | 16 |
| Bellies, good | 6½ | „ | 7½ |
| Bellies, short and wasty | 5 | „ | 6¼ |
| Locks and pieces | 3½ | „ | 5½ |
| Grease, coarse and coloured | 6¼ | „ | 6¾ |
| Scoured, coarse and coloured | 9 | „ | 14 |
| Basuto grease, short | 6¾ | „ | 7 |
| O.F.S. grassveld grease, long and well-conditioned (special clips) | 8¼ | „ | 9 |
| O.F.S. grassveld grease, long and well-conditioned | 7 | „ | 7½ |
| O.F.S. grassveld grease, medium grown, light, with little fault | 6¼ | „ | 7 |

| | d. | | d. |
|---|---|---|---|
| O.F.S. grassveld grease, short, faulty, and wasty | 5½ | to | 6¼ |
| O.F.S. Karroo grown, long and well-conditioned | 6¾ | „ | 7½ |
| O.F.S. medium grown, light, with little fault | 6 | to | 7 |
| O.F.S. short, faulty, and wasty | 5 | „ | 6 |

*Mohair.*—During the month business in this article has been limited.

Early in the month buyers had their orders for winter hair filled or cancelled, and prices receded as sharply as they rose the previous month.

Without any general inquiry our quotations must be considered nominal, but 10¾d. to 11d. is the best stated price for best winter hair to-day.

Winter kids have received scant attention, and only the super descriptions in small quantities have been placed at from 17d. to 18d.

Small parcels of Basuto hair changed hands earlier in the month at up to 12¼d., but this description also is now quiet without sales.

We quote the following prices, which must be considered nominal:—

| | d. | | d. |
|---|---|---|---|
| Super summer kids | 25 | to | 26 |
| Good to super summer kids | 22 | „ | 24 |
| Mixed kids | 14 | „ | 16 |
| Super firsts | 12½ | „ | 13½ |
| Mixed firsts | 12 | „ | 12½ |
| Superfine long blue O.F.S. hair | 13½ | „ | 14¾ |
| Snperfine long blue O.F.S. kids | 20 | „ | 20 |
| Mixed O.F.S. mohair (average) | 11 | „ | 12 |
| Mixed O.F.S. mohair, very mixed | 9 | „ | 10 |
| Seconds and grey | 7½ | to | 9 |
| Thirds | 6 | „ | 7½ |
| Winter kids, special clips (nominal) | 16 | „ | 18 |
| Winter kids, good ordinary (nominal) | 14 | „ | 15 |
| Winter mohair (nominal) | 11 | „ | 11 |
| Basuto mohair | 11½ | „ | 11¾ |
| Basuto mohair, grey | 8 | „ | 9 |

*Skins.*—Prices are lower. The following are the prices we obtained for the several descriptions this week:—Sheepskins, 6⅝d. per lb.; damaged, 5⅝d. per lb. Pelts, 4⅝d. per lb.; damaged, 3⅝d. per lb. Hair Capes, 3s. each; sundried, 2s. each; cut, 1s. each; damaged, 8d. each. Coarse wools, 6½d. per lb.; damaged, 4½d. per lb. Goat, 13d. per lb.; heavy, 10½d. per lb.; sundried, 11d. per lb.; damaged, 6½d. per lb. Bastards, 11d. per lb.; damaged, 5d. per lb. Angora, 8½d. per lb.; sundried and heavy, 7½d. per lb.; shorn, 6½d. per lb.; damaged, 4½d. per lb. Johannesburg sheep, 5d.; damaged sheep, 2½d. Pelts, 2½d. Goat, 10d.; damaged, 5d. Angora, 6½d.; damaged, 2d. per lb.

A large quantity of sheepskins are being received by us in a very seedy condition. Buyers will only purchase these at the price of damaged skins.

*Hides.*—Sundried, 13d.; damaged, 12d.; salted, 12d.; damaged, 11d. per lb.

*Horns.*—3½d. each all round.

## EAST LONDON.

The Produce Department of Messrs. Malcomess & Co., Ltd., write as follows under date 29th November, 1913:—

We confirm our lines of the 30th ult. and have now to report on the opening of the sixth and last series of London Colonial wool sales for this year.

The total quantities available for the series are as follows:—

140,000 bales Australians
2,500 „ Capes.

On the opening night of the sales, Tuesday, the 25th inst., 9400 bales Australians and 500 bales Capes were offered. There was a good attendance of buyers, and fair competition, and the market was quoted: "Par to 5 per cent. lower for long wools, slightly easier for snowwhites," and as no further news has been received we presume that the sales are progressing on about the same level.

In *Bradford* the market has been very weak, and a considerable setback in prices since we last addressed our friends. Whereas 28–28½d. was obtainable at the end of last month prices fell as low as 27d. during the month, and about a ½d. more would be the utmost obtainable now.

The *Continental markets* have been fairly active and a good weight of business has been put through. Some spinners and manufacturers have reduced their limits, but generally the Continental buyers have operated very freely.

The *Local market* has, of course, reflected the European position. The Bradford buyers have been absolutely out of the market—obtaining scarce a bale, while the Continental buyers who, it is reported, have been operating somewhat speculatively, have lifted the greater part of the wools sold.

Super long clips have fetched extreme prices, and also the really super Kaffrarian farmers, both long and short—the latter going as high as 11¼d.

There is no doubt that in view of the reports of the weak tendency of the European markets, the firmness displayed here is surprising.

There is no doubt, however, that a good many of the heavy classes of wools are not opening up as well as was expected. Instead of being clean, dry, light, there are many wools that are earthy, yolky, droughty, heavy, and we should not be surprised to find some of the buyers complaining later on of bad yields.

Locally the month has brought with it some record catalogues which have totalled over 1000 lots. Details are as follows :—

| | | | | | |
|---|---|---|---|---|---|
| Sale 3rd November | ... | 2,750 | offered, | 2,000 | sold. |
| 10th „ | ... | 5,000 | „ | 3,600 | „ |
| 17th „ | ... | 6,400 | „ | 4,200 | „ |
| 24th „ | ... | 7,500 | „ | 4,000 | „ |
| | | 21,650 | offered, | 13,800 | sold, |

plus wools sold privately and after sale—probably a grand total of 20,000 bales. which, in view of the news from Europe, is far more than was expected.

We quote as follows :—

| | |
|---|---|
| Transkeis—good, clean, light lots | 8¼d. to 8¾d. |
| Transkeis—average lots | 7½d. „ 8d. |
| Basutos—good average lots | 6¾d. „ 7¼d. |
| Basutos—earthier, heavier | 6½d. „ 6¾d. |
| Super long Kaffrarian farmers | 9d. „ 11d. |
| Super short Kaffrarian farmers | 8d. „ 11d. |
| Super long well-conditioned grassveld | 7d. „ 10d. |
| Super short well-conditioned grassveld | 6½d. „ 8½d. |
| Short faulty grease | 5d. „ 7½d. |
| Coarse and coloured grease, good average | 6d. „ 6½d. |
| Coarse and coloured grease, kempy | 4d. „ 5½d. |

*Mohair.*—This market has been very quiet and dull, and several buyers had their limit reduced. We quote considerably lower, at :—

| | |
|---|---|
| Very best long blue mohair, free from kemp | 13d. |
| Good long blue mohair, slightly kempy | 11½d. |
| Superior Herschel mohair | 11d. to 11½d. |
| Superior Basuto mohair | 10½d. „ 11d. |
| Average Basuto mohair | 9½d. „ 10d. |
| Best winter hair | 10¾d. |
| Average winter hair | 10d. |
| Genuine winter kids | 15d. (nominal). |
| Coarse and coloured mohair | 5d. to 6d. |

*Sundry Produce.*—Under this heading too there have been considerable declines, and hides especially were a very weak proposition at the last sales, large quantities being withdrawn, while the sales put through registered a decline of about a halfpenny all round.

We quote :—

| | | | |
|---|---|---|---|
| Sundried hides | 12½d. | Goatskins | 12¼d. to 12½d. |
| Dry-salted hides | 11½d. | Angora skins | 8d. |
| Sheepskins—1st quality | 6½d. | Bastards | 10d. to 10¼d. |
| „ C. and C. skins | 5½d. to 6d. | Damaged | 6d. each. |
| „ Pelts | 4½d. | Horns, according to size and quality | 2d. to 3d. each. |
| „ Transkei parcels | 5d. | | |

## DURBAN.

Messrs. Reid & Acutt's Wool Mart, Ltd., Esplanade, Durban, report as follows under date 1st December, 1913 :—

*Wool.*—During the month of November arrivals of the new clip on this market have been very large. We have to advise that during the last three weeks wool values generally have declined sharply, and the market is now in a dull and unsettled condition.

As is generally the case, the decline has been chiefly directed against heavy-conditioned, wasty wools, which are now only saleable at rates considerably under those current a month ago.

While values for all classes have gone back, at the same time well-grown, light-conditioned wools have suffered least, and these, we are pleased to say, are still in demand and command good rates.

We continue to catalogue large numbers of earefully got up skirted farmers' clips, and these are selling well. Mr. Jas. R. White, of Babanango, made 10⅜d.; Mr. Wm. Steel, of Botha's Pass, Newcastle, 10⅝d.; and Mr. E. C. Long-Innes, of Glenmore, Volksrust, 10¼d. for wethers and 10⅛d. for lambs, the bellies and skirts of this clip selling at 8¾d. and 8½d. respectively. Mr. H. P. Maree, of Senekal, realized up to 9⅜d. for his wool.

*Mohair.*—This market has lately developed a much duller tone, and prices all round are easier.

The following are the prices current here to-day:—

## NATAL.

| *Midlands.* | d. | | d. |
|---|---|---|---|
| 12 months' super light......... | 11 | to | 12½ |
| 12 months' average............ | 9 | „ | 11 |
| 12 months, heavy and faulty.... | 7½ | „ | 8 |
| 6 to 9 months' super light...... | 7 | „ | 8½ |
| 6 to 9 months, heavy and faulty. | 6 | „ | 7 |

| *Newcastle, Dundee, etc.* | d. | | d. |
|---|---|---|---|
| 12 months' super light.......... | 8¾ | „ | 9½ |
| 12 months' average............ | 7 | „ | 8 |
| 12 months, heavy and faulty.... | 6 | to | 7 |
| 6 to 9 months' super light...... | 7 | „ | 7¾ |
| 6 to 9 months, heavy and faulty. | 6 | „ | 6¾ |

| *Utrecht, Vryheid, etc.* | d. | | d. |
|---|---|---|---|
| 12 months' super light......... | 8 | „ | 9 |
| 12 months' average............ | 7 | „ | 7¾ |
| 12 months, heavy and faulty.... | 5¾ | „ | 6¾ |
| 6 to 9 months' super light...... | 6½ | „ | 7½ |
| 6 to 9 months, heavy and faulty. | 5½ | „ | 6½ |

## TRANSVAAL.

| *Volksrust, Wakkerstroom, Ermelo, Amersfoort, etc.* | d. | | d. |
|---|---|---|---|
| 12 months' super light......... | 8 | to | 9¾ |
| 12 months' average............ | 7 | „ | 8 |
| 12 months, heavy and faulty.... | 6¼ | „ | 7 |
| 6 to 9 months' super light...... | 6½ | „ | 7½ |
| 6 to 9 months, heavy and faulty. | 5¾ | „ | 6½ |

| *Standerton, Bethal, Middelburg, etc.* | d. | | d. |
|---|---|---|---|
| 12 months' super light......... | 7¼ | to | 8¼ |
| 12 months' average............ | 6½ | „ | 7½ |
| 12 months, heavy and faulty.... | 5¾ | „ | 6¾ |
| 6 to 9 months, super light...... | 6¼ | „ | 7¼ |
| 6 to 9 months, heavy and faulty. | 5 | „ | 6 |

| *Belfast, Lydenburg, Machadodorp.* | d. | | d. |
|---|---|---|---|
| 12 months' super light......... | 7½ | to | 8¾ |
| 12 months' average............ | 7 | „ | 7¾ |
| 12 months, heavy and faulty.... | 6 | „ | 7 |
| 6 to 9 months' super light...... | 6½ | „ | 7½ |
| 6 to 9 months, heavy and faulty. | 5¼ | „ | 6¼ |

| *Heidelberg, Pretoria, Klerksdorp, Lichtenburg, Potchefstroom.* | d. | | d. |
|---|---|---|---|
| 12 months' super light......... | 6½ | to | 7¾ |
| 12 months' average............ | 6 | „ | 7 |
| 12 months, heavy and faulty.... | 5¼ | „ | 6¼ |
| 6 to 9 months, super light...... | 6 | „ | 6¾ |
| 6 to 9 months, heavy and faulty. | 5 | „ | 6 |

## ORANGE FREE STATE.

| *Harrismith, Bethlehem, Vrede, Heilbron, Frankfort, etc.* | d. | | d. |
|---|---|---|---|
| 12 months' super light......... | 8 | to | 8¾ |
| 12 months' average............ | 7 | „ | 7¾ |
| 12 months, heavy and faulty.... | 6 | „ | 7 |
| 6 to 9 months, super light...... | 6¼ | „ | 7¼ |
| 6 to 9 months, heavy and faulty. | 5½ | „ | 6¼ |

| *Lindley, Kroonstad, Vredefort, Parys, etc.* | d. | | d. |
|---|---|---|---|
| 12 months' super light......... | 7¼ | to | 8¼ |
| 12 months' average............ | 6¼ | „ | 7¼ |
| 12 months, heavy and faulty.... | 5¾ | „ | 6½ |
| 6 to 9 months, super light...... | 6 | to | 6¾ |
| 6 to 9 months, heavy and faulty. | 5 | „ | 6 |

| *Senekal, Winburg, Ficksburg, Ladybrand, Thaba'Nchu, Bloemfontein.* | d. | | d. |
|---|---|---|---|
| 12 months' super light......... | 7¼ | to | 8½ |
| 12 months' average............ | 6¼ | „ | 7 |
| 12 montus, heavy and faulty.... | 5½ | „ | 6¼ |
| 6 to 9 months, super light...... | 5¾ | „ | 6½ |
| 6 to 9 months, heavy and faulty. | 4¾ | „ | 5¾ |

## EAST GRIQUALAND.

| | d. | | d. |
|---|---|---|---|
| 12 months' super light......... | 8 | to | 9 |
| 12 months' average............ | 7 | „ | 8 |
| 12 months, heavy and faulty.... | 6 | „ | 6¾ |
| 6 to 9 months' super light...... | 6¼ | to | 7¼ |
| 6 to 9 months, heavy and faulty. | 5 | „ | 6 |

TRANSKEI.

| | d. | | d. | | d. | | d. |
|---|---|---|---|---|---|---|---|
| 12 months' super light .......... | 6¾ | to | 7¾ | 12 months, heavy and faulty.... | 5¾ | to | 6½ |
| 12 months' average............ | 6 | „ | 7 | | | | |

BASUTO AND NATIVE WOOL.

| | d. | | d. | | d. | | d. |
|---|---|---|---|---|---|---|---|
| 12 months' super light .......... | 6 | to | 7 | 12 months, heavy and faulty.... | 5 | to | 5¾ |
| 12 months' average............ | 5½ | „ | 6 | | | | |

*Coarse and Coloured.*—Market easier. Fine black, 6½d. to 7¼d.; good average, free from kemps, 6d. to 6¾d.; ordinary, 5d. to 6d.; inferior, 3d. to 5d.

*Mohair.*—Market somewhat weaker. Kids, super long, 1[illegible]d. to 20d. (nominal); long blue super, 12½d. to 13d ; long blue average, 11d. to 12¼d.; good winter, 10½d. to 11d.; short and mixed winter, 9d. to 10½d.; inferior and coloured, 6d. to 9d.

*Basuto and Native.*—Good length, 11d. to 11½d.; average, 10d. to 10¾d.; inferior and short, 6d. to 9d.

*Hides, Skins, Horns, etc.*—HIDES, sun dried, 14 to 20 lb. average, 12d. to 13d. per lb.; sun dried, inferior, 8d. to 9d. per lb.; salted, 9½d. to 11d. per lb. SHEEPSKINS, long woolled, 5½d. to 6½d. per lb.; short woolled, 4d. to 5d. per lb.; pelts, 1½d. to 3d. per lb.; coarse and coloured, 3d. to 5d. per lb.; salted heavy, 4d. to 5¼d. per lb. GOATSKINS, mixed parcels, sound, 5d. to 8d. per lb., inferior, 2d. to 3d per lb. HORNS, 3d. to 12d. per pair.

*Wattle Bark.*—Market firm. Cut and bagged, good colour and quality, 4s. 9d. to 5s. 9d. per cwt.; cut and bagged, inferior colour and quality, 3s. to 4s. 6d.; uncut in bundles, good colour and quality, 3s. to 4s.; uncut in bundles, inferior, 2s. to 3s.

# Agricultural Show Dates, 1914.

***Secretaries of Societies which propose holding shows during 1914, the dates of which do not appear in the following list, are invited to send particulars at the earliest opportunity.***

## Cape Province.

Paarl.—Thursday, 29th January.
Robertson.—Tuesday and Wednesday, 3rd and 4th February.
Stellenbosch.—Thursday, 5th February.
Britstown.—Wednesday, 11th February.
Worcester.—Thursday and Friday, 12th and 13th February.
Caledon.—Tuesday and Wednesday, 17th and 18th February.
Queenstown.—Wednesday and Thursday, 18th and 19th February.
Beaufort West.—Wednesday and Thursday, 18th and 19th February.
Ceres.—Tuesday, 17th February.
Wodehouse.—Tuesday and Wednesday, 24th and 25th February.
Rosebank.—Tuesday to Friday, 24th to 27th February.
Cathcart.—Tuesday, 24th February.
Dordrecht.—Tuesday and Wednesday, 24th and 25th February.
Malmesbury.—Wednesday, 19th February.
Graaff-Reinet.—Wednesday and Thursday, 25th and 26th February.
Kingwilliamstown.—Thursday to Saturday, 26th to 28th February.
Middelburg.—Monday to Wednesday, 2nd to 4th March.
Barkly East.—Tuesday 3rd March.
East London.—Thursday and Friday, 5th and 6th March.
Cradock.—Thursday and Friday, 5th and 6th March.
Molteno.—Tuesday and Wednesday, 10th and 11th March.
Somerset East.—Tuesday and Wednesday, 10th and 11th March.
George.—Wednesday, 4th March.
Aliwal North.—Thursday and Friday, 12th and 13th March.
Grahamstown.—Thursday and Friday, 12th and 13th March.
Humansdorp.—Thursday and Friday, 12th and 13th March.
Port Elizabeth.—Tuesday to Friday, 17th to 20th March.
Kimberley.—Tuesday to Friday, 24th to 27th March.
Oudtshoorn.—Wednesday and Thursday, 15th and 16th April.

## Orange Free State Province.

Rouxville.—Wednesday and Thursday, 18th and 19th February.
Philippolis.—Wednesday and Thursday, 18th and 19th March.
Wepener.—Wednesday and Thursday, 25th and 26th February.
Ladybrand.—Wednesday and Thursday, 10th and 11th March.
Smithfield.—Tuesday and Wednesday, 3rd and 4th March.
Thaba 'Nchu.—Tuesday and Wednesday, 3rd and 4th March.
Senekal.—Tuesday and Wednesday, 3rd and 4th March.
Vrede.—Tuesday and Wednesday, 3rd and 4th March.
Hoopstad.—Tuesday and Wednesday, 3rd and 4th March.
Jagersfontein.—Tuesday and Wednesday, 3rd and 4th March.
Fauresmith.—Tuesday and Wednesday, 10th and 11th March.
Bethlehem.—Tuesday and Wednesday, 10th and 11th March.
Heilbron.—Tuesday and Wednesday, 10th and 11th March.
Harrismith.—Wednesday and Thursday, 18th and 19th March.
Boshof.—Wednesday and Thursday, 18th and 19th March.
Clocolan.—Wednesday and Thursday, 18th and 19th March.
Frankfort.—Wednesday and Thursday, 18th and 19th March.
Lindley.—Wednesday and Thursday, 18th and 19th March.
Kroonstad.—Wednesday and Thursday, 25th and 26th March.
Winburg.—Wednesday and Thursday, 25th and 26th March.
Edenburg.—Wednesday and Thursday, 25th and 26th March.
Ficksburg.—Wednesday and Thursday, 25th and 26th March.
Bloemfontein.—Tuesday to Friday, 31st March to 3rd April.

TRANSVAAL.

Middelburg.—Monday, 2nd February.
Ermelo.—Thursday and Friday, 5th and 6th March.
Bronkhorstspruit.—Wednesday, 11th Feb.
Standerton.—Wednesday and Thursday, 25th and 26th March.
Carolina.—Wednesday, 25th March.
Heidelberg.—Tuesday and Wednesday, 7th and 8th April.
Witwatersrand.—Wednesday to Saturday 15th to 18th April.
Potchefstroom.—Wednesday and Thursday, 22nd and 23rd April.
Nylstroom.—Friday, 15th May.
Pretoria.—Friday, Saturday, and Monday, 22nd, 23rd, and 25th May.
Pietersburg.—Thursday and Friday, 11th, and 12th June.
South Magaliesburg.—Wednesday, 8th July.

OTHER SHOWS.

Pietermaritzburg.—Wednesday, Thursday, and Friday, 24th, 25th, and 26th June.
Polela (Natal).—Friday, 6th February.

# Export of Fruit.

THE following statement shows the description and declared value of fresh fruit exported from the Union of South Africa during the month of October, 1913, distinguishing port of shipment :—

OCTOBER, 1913.

| Description. | Via Capetown. | Via Port Elizabeth. | Via East London. | Via Durban. | Via Delagoa Bay. | TOTAL. |
|---|---|---|---|---|---|---|
| | £ | £ | £ | £ | £ | £ |
| Apples ... ... ... | 43 | — | — | 3 | — | 46 |
| Apricots ... ... ... | — | — | — | — | — | — |
| Bananas ... ... ... | 25 | — | 2 | 41 | — | 68 |
| Grapes ... ... ... | — | — | — | — | — | — |
| Guavas ... ... ... | — | — | — | — | — | — |
| Lemons ... ... ... | 8 | — | — | 6 | — | 14 |
| Mangoes ... ... ... | — | — | — | — | — | — |
| Melons ... ... ... | — | — | — | — | — | — |
| Naartjes ... ... ... | 1 | — | 9 | 92 | — | 102 |
| Nectarines ... ... | — | — | — | — | — | — |
| Oranges ... ... ... | 114 | — | 6 | 135 | — | 255 |
| Paw-paws ... ... ... | — | — | — | 17 | — | 17 |
| Peaches ... ... ... | — | — | — | — | — | — |
| Pears ... ... ... | — | — | — | — | — | — |
| Pineapples ... ... | 27 | — | 2 | 34 | — | 63 |
| Plums ... ... ... | — | — | — | — | — | — |
| Other kinds ... ... | 12 | — | — | 30 | — | 42 |
| TOTAL ... £ | 230 | — | 19 | 358 | — | 607 |

# Importation of Live Stock.

RETURN showing particulars of certain Pure-Bred Live Stock recently imported into the Union of South Africa.

| Stud-book No. or Name. | Breed, and Stud-book in which Registered. | Sex. | Country of Origin. | Importer's Name and Address. |
|---|---|---|---|---|
| *Horses.* | | | | |
| No particulars | No particulars | Stallion | U.K. | D. I. de Wet, Montagu, C.P. (7/10/13). |
| "Catchfly," "Venetian Mast," "Pamspas" | " | Mares | " | " " " |
| "Wilhelmina II," "Gretna Green," "Kitty," "Finnebrogue," "Icebound," "May Green" | " | Fillies | " | " " " |
| No name | " | Stallion | " | " " (22/10/13). |
| "Curmella" | " | " | " | " " " |
| "Jeweller" | Thoroughbred—English Stud-book, vol. XXI, p. 879. | " | Ireland | A. G. Crout, Ellevale, Thaba 'Nchu District, O.F.S. (10/10/13). |
| No particulars | " " " " XXII | " | U.K. | J. C. Rabie, Nuy, Worcester (15/10/13). |
| "Hallow Eve" | " " " " XXI, p. 422 | Mare | Ireland | S. Goodall, Queen's Hotel, Capetown (15/10/13). |
| "Cherisette" | " " " " XXI | " | U.K. | G. H. O'Meara, P.O. Box 822, Johannesburg (15/10/13). |
| No particulars (two animals) | Hackney—Hackney Horse Society, vols. 25 and 29 | Stallions | " | J. C. Rabie, Nuy, Worcester, and J. R. Home, Worcester (15/10/13). |
| Nos. 11900, 12265, and 11233 (three animals) | " " " " | " | " | W. A. Bester, Reitz, O.F.S. (28/10/13). |
| *Asses.* | | | | |
| "Anquila," No. 187 | Catalonian—Catalan Stud-book | Jack | Spain | J. Pierce, Heilbron, O.F.S. (20/10/13). |
| "Pulet," No. 209 | " " " | " | " | " " " |
| No particulars (four animals) | " " " | Jacks | Barcelona | C. A. Pope, Molteno (17/10/13). |

| | | | | | |
|---|---|---|---|---|---|
| *Cattle.* | | | | | |
| "Hertog," F.2987/M.22754 H. | Friesland | —No particulars | Bull | Holland | T. W. Reid, Johannesburg (27/10/13). |
| "Max," F.5511/M.19987 H. | " | " | " | " | " " " |
| "Jan III," F.2987/M.22754 H. | " | " | " | " | " " " |
| "Hein," F.4613/M.13309 | " | " | " | " | " " " |
| "Emma III," F.637–15' | " | " | Heifer | " | " " " |
| "Clara II," R.J.V. 4819 | " | " | " | " | " " " |
| "Juliana I," F.637–15' | " | " | " | " | " " " |
| No. 1106 | " | Het Nederlandsche Rundvee Stamboek | Bull | " | A. J. Chiappini, Retreat (15/10/13). |
| Nos. 18346, 17572, 17805, 18639, 18412, 16901 (six animals) | " | " " " " | Cows | " | J. H. Gertzen, Middelburg, C.P. (15/10/13). |
| "Buringa XI," F.5114/M.16744 | " | Netherland Department of Agriculture | Bull | " | Chas. Leonard, Gloria, Villiersdorp (15/10/13). |
| "Haaifo XII," F 4036/M.13453 | " | Netherland Stud-book | Cow | Holland | H. Atkins, Hope Valley, Ferreira Station, near Bloemfontein (17/10/13). |
| "Everda II," 6178 | " | " " | Bull | " | " " " |
| "Jan," 5127 | | " | " | " | " " " |
| "Afke Goudmijn," F.19464/M.15084 H. | " | " " | Cow | " | " " " |
| "Lakenveldsche," F.3620/M.12983 | " | " " | " | " | " " " |
| "Alida IV," F.5311/M.11786 | " | " " | " | " | " " " |
| "Amelander V" F.4701/M.12215 H. | " | " " | " | " | " " " |
| "Bertha Emil" | " | " " | " | " | " " " |
| "Zwarte Wolk" | " | " " | " | " | " " " |
| "Negerin" | " | " " | " | " | " " " |
| "Kartineke X" | " | " " | " | " | " " " |
| "Grijtsje" | " | " " | " | " | " " " |
| "Boukje VI" | " | " " | " | " | " " " |
| "Bleske IX" | " | " " | " | " | " " " |
| "Rosetta IV" | " | " " | " | " | " " " |
| "Janke VII" | " | " " | " | " | " " " |
| "Hoogland XX" | " | " " | " | " | " " " |
| "Alida IV," F.4965/M.16083 | " | " " | " | " | " " " |
| "Pietje III" | " | " " | " | " | " " " |
| "Rosetta III" | " | " " | " | " | " " " |
| "Renske XII" | " | " " | " | " | " " " |

| Stud-book No. or Name. | Breed, and Stud-book in which Registered. | Sex. | Country of Origin. | Importer's Name and Address. |
|---|---|---|---|---|
| *Cattle* (continued). | | | | |
| "Diana III" | Friesland—Netherland Stud-Book | Cow | Holland | H. Atkins, Hope Valley, Ferreira Station, near Bloemfontein (17 10 13). |
| "Anema II" | ,, ,, ,, | ,, | ,, | ,, ,, ,, |
| "Koosje" | ,, ,, ,, | ,, | ,, | A. A. Larter, Guba Park, Indwe (17/10/13). |
| "Goliath II," F.2062/M.17646 | ,, ,, ,, | Bull | ,, | ,, ,, ,, |
| "Bonte Knol V" | ,, ,, ,, | Cow | ,, | ,, ,, ,, |
| "Syke VI" | ,, ,, ,, | ,, | ,, | ,, ,, ,, |
| "Rintje VII" | ,, ,, ,, | ,, | ,, | ,, ,, ,, |
| "Maria" | ,, ,, ,, | ,, | ,, | ,, ,, ,, |
| "Grietje" | ,, ,, ,, | ,, | ,, | ,, ,, ,, |
| "Janke VII" | ,, ,, ,, | ,, | ,, | ,, ,, ,, |
| "Frijntje IV" | ,, ,, ,, | ,, | ,, | ,, ,, ,, |
| "Goliath," No. 6158 | ,, ,, ,, | Bull calf | ,, | ,, ,, ,, |
| "Pride II of Elphinstone," No. 50280 | Aberdeen-Angus—Aberdeen-Angus Cattle Society | Heifer | Scotland | Thomas Rodger, Dryharts, Vryburg, B.P. (9/10/13) |
| "Roseleaf of Elphinstone," No. 50285 | ,, ,, ,, ,, ,, ,, | ,, | ,, | ,, ,, ,, |
| "Prince of Bywell" | ,, ,, ,, ,, ,, ,, vol. 38 | Bull | ,, | ,, ,, (13/10/13). |
| "Prince Egmont of the Burn," No. 32370 | ,, ,, ,, ,, ,, | ,, | ,, | ,, ,, ,, |
| "Bathput," No. 7845 | Devon—Highfield Herd | ,, | England | D. H. Newett, P.O. Box 94, Salisbury (9/10/13) |
| "Milverton Boy" | ,, ,, ,, vol. 37 | ,, | ,, | ,, ,, ,, |
| "Gamester," No. 7714 | ,, ,, ,, | ,, | ,, | ,, ,, ,, |
| "Glampit Gallant," No. 7639 | ,, ,, ,, | ,, | ,, | ,, ,, ,, |
| "Curly's Laddie," No. 7655 | ,, ,, ,, | ,, | ,, | ,, ,, ,, |
| "Pound Delegate II," No. 7830 | ,, ,, ,, | ,, | ,, | ,, ,, ,, |
| "Woodlands Royal," No. 7906 | ,, ,, ,, | ,, | ,, | ,, ,, ,, |
| "Brimstone," No. 7620 | ,, ,, ,, | ,, | ,, | ,, ,, ,, |
| "Highfield Comfit," No. 26057 | ,, ,, ,, | Heifer | ,, | ,, ,, ,, |
| "Highfield Barmaid," No. 26053 | ,, ,, ,, | ,, | ,, | ,, ,, ,, |

| | | | | |
|---|---|---|---|---|
| "Highfield Prim III," No. 26074 | " " " | " | " | " " " |
| "Highfield Lily," No. 26070 | " " " | " | " | " " " |
| "Highfield Red Daisy," No. 26075 | " " " | " | " | " " " |
| "Gordon's Mastiff," No. 7091. | Devon—Devon Herd-book | Bull | U.K. | Rhodesia, Ltd., Bulawayo (29/10/13). |
| "Bickley Zealot," No. 7609 | " " " | " | " | " " " |
| "Bickley Zider," No. 7610 | " " " | " | " | " " " |
| "Court Pedlar," No. 7650 | " " " | " | " | " " " |
| "Court Mars," No. 7649 | " " " | " | " | " " " |
| "Withycombe Yeoman," No. 7899 | " " " | " | " | " " " |
| "Withycombe Scout," No. 7898 | " " " | " | " | " " " |
| "Cowboy II" | " " " vol. 37 | " | " | " " " |
| "Farrington Don" | " " " | " | " | " " " |
| No particulars | South Devon—South Devon Herd-book, vol. 13, p. 156 | " | " | Agricultural Co-operative Union, 228 Church Street, Maritzburg (13/10/13). |
| "King Splendid," No. 4425 | " " " " 13, p. 159 | " | Great Britain | Max Rose, Ladismith, C.P. (15/10/13) |
| "Midland Masterpiece," No. 4652 | " " " " " " 13, p. 158 | " | " | " " " |
| "Good Sort," No. 4395 | " " " " " " 13, p. 156 | " | " | " " " |
| "Good Luck," No. 4394 | " " " " " " 13, p. 157 | " | " | " " " |
| "Gentle Boy," No. 4383 | " " " " " " 13, p. 161 | " | " | " " " |
| "Wornwell Detective," No. 4660 | " " " " " " 13, p. 16[illegible] | " | " | " " " |
| "Spriddlescombe Nobleman," No. 4591 | " " " " " " 13, p. 175 | " | " | " " " |
| "Lo Ben," No. 4447 | " " " " " " 13, p. 160 | " | " | " " " |
| "Spriddlescombe Ruler," No. 4594 | " " " " " 13 p. 174 | " | " | " " " |
| "Primley Fusilier," No. 4542 | " " " " " " 13, p. 149 | " | " | " " " |
| No particulars | " " " " " " 14 | " | U.K. | Wm. Wood, Nottingham Road, Natal (15/10/13). |
| No. 4527 | " " " " " " 13, p. 158 | " | " | H. G. Plant, Frankfort (24/10/13). |
| Nos. 11853, 10995, 10924, 11787, 10925, 11488 (six animals) | " " " " " " 13, pp. 242, 86, 79, 79, 201, and 201 | Heifers | " | " " " |
| "Woodford Lass" | South Devon—South Devon Herd-book, vol. 14, p. 192 | Heifer | " | " " " |
| No. 11491 | " " " " " " 14, p. 201 | " | " | " " " |
| Nos. 4663, 4569, and 4446 (three animals) | " " " " " | Bulls | " | Thomson & Arnott, Highflats, Natal (24/10/13). |
| No particulars | " " " " " vol. 13, p. 173 | Bull | " | R. C. King, Val, Transvaal (28/10/13). |

| Stud-book No. or Name. | Breed, and Stud-book in which Registered. | Sex. | Country of Origin. | Importer's Name and Address. |
|---|---|---|---|---|
| *Cattle* (continued). | | | | |
| "Princess Dorothy" | Shorthorn—Shorthorn Cattle Society | Cow | Great Britain | Harold L. Phillips, Brederstroom Farm, Haenertsburg (15/10/13). |
| "Clematis 17th" | ,, ,, ,, ,, | ,, | ,, | ,, ,, ,, |
| "Lady Charming" | ,, ,, ,, ,, | ,, | ,, | ,, ,, ,, |
| "Woolmers Duchess III" | ,, ,, ,, ,, | ,, | ,, | ,, ,, ,, |
| "Heath Wild Eyes" | ,, ,, ,, ,, | ,, | ,, | ,, ,, ,, |
| "Barington Rose 3rd" | ,, ,, ,, ,, | ,, | ,, | ,, |
| "Highflyer," No. 115857 | ,, ,, ,, ,, | Bull | ,, | ,, ,, ,, |
| "Coral Reef" | Shorthorn—Coates' Herd-book, vol. 60 | ,, | Scotland | H. Lamont, Aliwal North (23/10/13). |
| "Throsk Augustus," No. 118009 | ,, ,, ,, ,, 59, p. 452 | ,, | ,, | ,, ,, ,, |
| Nos. 113003 and 116253 (two animals) | Shorthorn—Shorthorn Cattle Society | Bulls | U.K. | G. W. Young, Wanstead, East Griqualand (28/10/13). |
| No. 108509 | ,, ,, ,, ,, | Bull | ,, | F. J. Collier, Hillary, Natal (28/10/13) |
| "South Caroline" | ,, ,, ,, ,, | Heifer | ,, | ,, ,, ,, |
| "South Queen 2nd" | ,, ,, ,, ,, | ,, | ,, | ,, ,, ,, |
| "Lady Dewberry" | ,, ,, ,, ,, | ,, | ,, | ,, ,, ,, |
| No particulars | ,, ,, ,, ,, vol. 59 | ,, | ,, | W. J. Fey, Elandskop, Natal (29/10/13). |
| "Waterloo Stamp" | ,, ,, ,, ,, ,, 60 | Bull | ,, | H. Voss, Ventersdorp (29/10/13). |
| "Broadhooks Sergeant," No. 114489 | Red Shorthorn—Coates' Herd-book, vol. 59, p. 76 | Bull | Scotland | T. A. Sinclair, Highlands, Fort Beaufort (21/10/13). |
| No particulars (four animals) | ,, ,, Lincolnshire Red Shorthorn Association, p. 20 | Cows | U.K. | Dr. Rouillard, Balgowan, Natal (27/10/13). |
| Nos. 9069, 8784 | ,, ,, Lincolnshire Red Shorthorn Association, vol. 4, p. 156, and vol. 19, p. 299 | Bulls | ,, | H. Voss, Ventersdorp (29/10/13). |
| "Dairymaid," "Duchess," "Oxford Princess," "Nelly 3rd," "Mavour," "Topsy," "Countess," "Duchess," "Daisy," and Nos. 35, 41, 45, 62, 66, 69 (fifteen animals) | ,, ,, Red Shorthorn Association, Melbourne | Heifers | Australia | J. Mattison, Colenso (29/10/13). |
| "Redgrave Rufus," No. 10476 | Red Poll—Red Poll Herd-book, vol. XXX | Bull | England | S. C. Skaife, Petrusburg, O.F.S. (18/10/13). |
| "Redgrave Charming Davy 22nd," No. 23668 | ,, ,, ,, ,, ,, ,, ,, | Heifer | ,, | ,, ,, ,, |

| | | | | |
|---|---|---|---|---|
| "Redgrave Pretty Flower 12th" No. 23676 | " " " " " " " ......... | " | " | " " " |
| "Redgrave Charming Davy 26th," No. 23672 | " " " " " " " ....... | " | " | " " " |
| "Redgrave Charming Davy 25th," No. 23671 | " " " " " " " ......... | " | " | " " " |
| "Redgrave Charming Davy 27th," No. 23673 | " " " " " " " ......... | " | " | " " " |
| "Hobsland Susie," No. 35819.. | Ayrshire—Ayrshire Cattle Herd-book............... | Heifer | Scotland | H. Atkins, Hope Valley, Ferreira, O.F.S. (30/10/13). |
| "Forward Point Nellie II," No. 31655 | " " " " ................ | " | " | " " " |
| "Forward Point Drap o' Dew," No. 31654 | " " " " ................ | " | " | " " " |
| "Wethercraig Lilac," No. 32226 | " " " " ................ | " | " | " " " |
| "Wethercraig Mistletoe," No. 32230 | " " " " ................ | " | " | " " " |
| "Dyke Princess," No. 35525... | " " " " ................ | " | " | " " " |
| No. 9503.................... | " " " " ................ | Bull | U.K. | Thomson & Arnott, Highflats, Natal (24/10/13). |
| No particulars................ | Hereford—Hereford Herd-book Society, vol. 44, p. 221 | " | " | T. A. Lewis, Thornville Junction, Natal (28/10/13). |
| *Sheep.* | | | | |
| No particulars (two animals)... | Merino—No particulars............................ | Rams | Australia | J. W. Butler, Kei Road, C.P. (28/10/13). |
| O.14508 R.................... | Shropshire—Shropshire Sheep-breeders' Association and Flock-book Society | Ram | U.K. | Wm. Wood, Nottingham Road, Natal (15/10/13). |
| *Pigs.* | | | | |
| "Sudbourne Champion," No. 4159 | Large Black—Large Black Pig Society, vol. 15...... | Boar | England | The Imperial Cold Storage and Supply Co., Capetown (15/10/13). |
| "Ilford Sweet Lavender II," No. 11782 | " " " " " " " " ..... | Sow | " | " " " |
| "Ilford Sweet Briar II," No. 11884 | " " " " " " " " ..... | " | " | " " " |
| "Redskin," No. 47........... | Tamworth—National Pig-breeders' Association........ | Boar | " | " " " |
| No particulars................ | Berkshire—British Berkshire Society Herd-book.... | " | " | Martin & Co., Perseverance (20/10/13) |
| "Manor Miss Eldred"......... | " " " " " ...... | Sow | " | " " " |
| "Manor Miss Arthur"......... | " " " " " ...... | " | " | " " " |

# Outbreaks of Animal Diseases.

THE following outbreaks of scheduled infectious and contagious animal diseases have occurred in the areas specified during the month ended 30th November, 1913.

C. E. GRAY,
*Principal Veterinary Surgeon (Union).*

## CAPE PROVINCE
(EXCLUDING TRANSKEIAN TERRITORIES.)

| DISEASE. | DISTRICT. | AREA OR NAME OF FARM. | Number of Deaths. | Number of Animals Affected. | Number of In-contacts. | Number of Animals Tested. | Number of Animals Reacted and Destroyed. | Number of Doubtful Reactors to be Retested. |
|---|---|---|---|---|---|---|---|---|
| Anthrax ... | Alexandria ... ... | Geelhoutboom ... ... ... ... ... ... | 1 | — | 90 | — | — | — |
| | Barkly West ... | Boetsap ... .. ... ... ... ... ... | 1 | — | Unknown. | — | — | — |
| | Hay ... ... | Cone, Griquatown... ... ... ... ... ... | 14 | — | 80 | — | — | — |
| | Mafeking ... ... | Logaging ... ... ... ... ... ... ... | 2 | — | 3 | — | — | — |
| | „ ... ... | De Rust ... ... ... ... ... ... ... | 2 | — | Unknown. | — | — | — |
| | Oudtshoorn... ... | Komnatie ... ... ... ... ... ... ... | 1 | — | Unknown. | — | — | — |
| East Coast Fever | East London ... | Kommetjes Laagte, Ward Seven ... ... ... | Ostrich 2 | — | 176 | — | — | — |
| Equine Scabies | Uniondale ... ... | Rietvlei ... ... ... ... ... ... ... | — | 4 | — | — | — | — |
| Tuberculosis ... | Cape ... ... | Various ... ... ... ... ... ... ... | — | — | — | 222 | 11 | 1 |
| | Malmesbury ... | „ ... ... ... ... ... ... ... | — | — | — | 59 | 3 | Nil |
| | Paarl ... ... | „ ... ... ... ... ... ... ... | — | — | — | 18 | 1 | Nil |
| | Stellenbosch ... | „ ... ... ... ... ... ... ... | — | — | — | 33 | Nil | 1 |

## NATAL.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| East Coast Fever | Impendhle ... ... | Nooitgedacht ... ... ... ... ... ... | — | 1 | 21 | — | — | — |
| | New Hanover ... | Green Branch Hotel, Wartburg ... ... ... ... | 1 | — | 46 | — | — | — |
| | Pietermaritzburg ... | Newhome ... ... ... ... ... ... ... | 1 | — | 15 | — | — | — |
| | Helpmakaar ... | Groetvlei ... ... ... ... ... ... ... | 1 | — | 53 | — | — | — |
| | Utrecht ... ... | Vechtkop ... ... ... ... ... ... ... | 2 | — | 416 | — | — | — |
| | Vryheid ... ... | Wanbestuur No. 164 ... ... ... ... ... | — | — | 30 | — | — | — |
| Anthrax ... | Richmond ... ... | The Oaks ... ... ... ... ... ... ... | 1 | — | 34 | — | — | — |
| | Pietermaritzburg ... | Allerton Laboratory ... ... ... ... ... | 1 | — | 25 (inoculated) | — | — | — |
| | Dundee ... ... | Dumain ... ... ... ... ... ... ... | 1 | — | — | — | — | — |
| Epizootic Lymphangitis | Lower Umzimkulu .. | Lot 23, Umtamvuna ... ... ... ... ... | — | 1 | 32 | — | — | — |
| Glanders ... | Pietermaritzburg ... | Pietermaritz Street ... ... ... ... ... | 1 clinically affected and destroyed | | — | 22 | 1 | — |
| | Durban ... ... | Sydenham ... ... ... ... ... ... ... | Do. | do. | — | 1 | 1 | — |
| Tuberculosis ... | Howick ... ... | Commonage ... ... ... ... ... ... | — | — | — | 7 | 3 | — |
| | Vryheid ... ... | Sandhurst ... ... ... ... ... ... ... | — | — | — | 31 | 1 | — |
| | Pietermaritzburg ... | The Willows ... ... ... ... ... ... | 1 | — | About 60 to be tested | — | — | — |
| Contagious Abortion | Vryheid ... ... | Inyati ... ... ... ... ... ... ... | — | 7 | — | 7 | — | — |

East Coast Fever exists in every Magisterial Division in Natal with the exception of Lower Tugela, Mapumulo, and Durban.

## TRANSVAAL.

| Disease. | District. | Area or Name of Farm. | Number of Deaths. | Number of Animals Affected. | Number of In-contacts. | Number of Animals Tested. | Number of Animals Reacted and Destroyed. | Number of Doubtful Reactors to be Retested. |
|---|---|---|---|---|---|---|---|---|
| *East Coast Fever | Piet Retief ... ... | Sterkwater No. 178 ... ... ... ... ... | — | — | — | — | — | — |
| Glanders ... | Germiston ... ... | Germiston ... ... ... ... ... ... ... | — | — | 25 | — | 1 | — |
| Anthrax ... | Potchefstroom ... | Elandsheuvel No. 376 ... ... ... ... ... | 1 | — | — | — | — | — |
| | Krugersdorp ... | *Wilgespruit No. 80* ... ... ... ... ... | 1 | — | 73 | 73 | — | — |
| | Witwatersrand ... | Daggafontein No. 25 ... ... ... ... ... | 1 | — | 24 | — | — | — |
| | *Waterberg ... ... | Blinkwater No. 1899 ... ... ... ... ... | 1 | — | 42 | — | — | — |
| | Potchefstroom ... | Wilgeboom No. 588 ... ... ... ... ... | 1 | — | 120 | — | — | — |
| | *Krugersdorp ... | Roodepoort No. 43 ... ... ... ... ... | 1 | — | 2 | 2 | — | — |
| | Witwatersrand ... | Klippoortje No. 2 ... ... ... ... ... ... | 1 | 16 | — | — | — | — |
| Mange in Equines | Rustenburg ... | Waterkloof No. 4 ... ... ... ... ... ... | — | 1 | — | — | — | — |
| Lung-sickness ... | Pretoria ... ... | Buffelsdrift No. 131 ... ... ... ... ... | 1 | 176 | — | — | — | — |
| *Tuberculosis ... | Krugersdorp ... | Randfontein ... ... ... ... ... ... | — | — | — | 4 | — | 2 |
| | *Pretoria ... ... | 188 Schoeman Street ... ... ... ... ... | — | — | — | 4 | 2 | — |
| *Swine Fever ... | Krugersdorp ... | Misgund No. 56 ... ... ... ... ... ... | — | — | 9 | — | — | — |

* Inadvertently omitted from October return. Outbreaks occurred in October. Districts in Transvaal in which East Coast Fever is prevalent:—Barberton Carolina, Lydenburg, Piet Retief, Pietersburg, Pretoria, Rustenburg, Wakkerstroom, and Zoutpansberg.

## ORANGE FREE STATE.

| Disease. | District. | Area or Name of Farm. | Number of Deaths. | Number of Animals Affected. | Number of In-contacts. | Number of Animals Tested. | Number of Animals Reacted and Destroyed. | Number of Doubtful Reactors to be Retested. |
|---|---|---|---|---|---|---|---|---|
| Glanders ... | Bethlehem ... ... | Erf No. 281, Reitz... ... ... ... ... ... | — | 1 | 5 | — | 1 | — |
| Contagious Abortion | „ ... ... | *Lucia* ... ... ... ... ... ... ... | — | 5 | 44 | — | — | — |
| | Bloemfontein ... | Grootvlei Government Farm ... ... ... ... | — | 1 | 34 | — | — | — |
| Mange ... ... | Ficksburg ... ... | Erf No. 100, Ficksburg ... ... ... ... ... | — | 1 | — | — | — | — |
| | Bethulie ... ... | Troostenberg ... ... ... ... ... ... | — | 4 | 2 | — | — | — |

TRANSKEI.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| East Coast Fever | Kentani ... ... | Simongos Location ... ... ... ... ... | 4 | — | 130 | — | — | — |
| | „ ... ... | Botmans Location... ... ... ... ... ... | 1 | — | 156 | — | — | — |
| | „ ... ... | Somanas Location... ... ... ... ... ... | 3 | — | 428 | — | — | — |
| | „ ... ... | Molisis Location ... ... ... ... ... ... | 1 | — | 30 | — | — | — |
| | „ ... ... | Centanganis Location ... ... ... ... ... | 1 | — | 297 | — | — | — |
| | Mount Ayliff ... | Mount Ayliff Commonage ... ... ... ... | — | Unknown. | Unknown. | — | — | — |
| | Mount Frere ... | Ganis Location ... ... ... ... ... ... ... | 2 | — | 242 | — | — | — |
| | Nqmakwe ... ... | Axegwanas... ... ... ... ... ... ... | 1 | — | 38 | — | — | — |
| | Qumbu ... ... | Milanis Location ... ... ... ... ... ... | 1 | — | 1479 | — | — | — |
| | „ ... | Motangas' ... ... ... ... ... ... ... | 2 | — | 505 | — | — | — |
| | Butterworth ... | Bushulus ... ... ... ... ... ... ... | — | Unknown. | Unknown. | — | — | — |
| | St. Marks ... ... | Falos Location, Falterns, Gungubelas, and Ntlokondalas | — | Unknown. | Unknown. | — | — | — |
| Lung-sickness ... | Engcobo ... ... | Site-Zost Location... ... ... ... ... ... | — | — | — | 64 | 1 | — |
| | „ ... | Nqwenanis Location ... ... ... ... ... | — | — | — | 172 | 4 | — |
| | Mqanduli ... ... | Sitmagis Location... ... ... ... ... ... | — | — | — | — | 1 | — |
| | Willowvale ... ... | Sipimzis Location ... ... ... ... ... ... | — | — | — | 4 | 1 | — |
| Anthrax ... | Kentani ... ... | Debeses Location ... ... ... ... ... ... | 1 | — | — | — | — | — |
| | „ ... | Madubelas Location ... ... ... ... ... | 1 | — | — | — | — | — |
| | „ ... | Jongamas Location ... ... ... ... ... | 1 | — | — | — | — | — |
| | Engcobo ... ... | Cwecweni Store ... ... ... ... ... ... | 1 | — | — | — | — | — |
| | Nqmakwe ... | Mavusos Location... ... ... ... ... ... | 5 | — | — | — | — | — |
| | Mount Frere ... | Commonage, Mount Frere ... ... ... ... | 1 | — | 36 | — | — | — |
| | Tsolo ... ... | Agricultural Institute ... ... ... ... ... | 1 | — | 212 | — | — | — |
| | Matatiele ... ... | Wallace ... ... ... ... ... ... ... | 1 | — | 210 | — | — | — |
| Glanders ... | Umtata ... ... | Commonage, Umtata ... ... ... ... ... | — | — | — | — | 1 | — |
| | Libode ... ... | Badlas Location ... ... ... ... ... ... | — | — | — | — | 2 | — |
| | Tabankulu ... ... | Tabankulu Village ... ... ... ... ... | — | — | — | 4 | 2 | — |
| Mange in Equines | Mount Currie ... | Marshmead... ... ... ... ... ... ... | — | 29 | — | — | — | — |

Matatiele District remains free from East Coast Fever.

# Current Market Rates of Agricultural Produce and Stock.

The following TABLE OF CURRENT MARKET RATES OF AGRICULTURAL PRODUCE AND LIVE STOCK on Saturday, 29th November, 1913, ruling at the several Centres named, is published for general information.

| Centre. | A. Wheat per 100 lb. | B. Wheat Flour per 100 lb. | C. Boer Meal per 100 lb. | D. Mealies per 100 lb. | E. Mealie Meal per 100 lb. | F. Barley per 100 lb. | G. Oats per 100 lb. | H. Oat-hay per 100 lb. | J. Lucerne Hay per 100 lb. | K. Potatoes per 100 lb. | L. Tobacco (Boer Roll) per lb. | M. Beef per lb. | N. Mutton per lb. | O. Fresh Butter per lb. | P. Eggs per dozen. | Q. Cattle (Slaughter). | R. Sheep (Slaughter). | S. Pigs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Cape Province:* | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | £ s. d. | s. d. | £ s. d. |
| Aliwal North ... | 12 6 | 22 6 | 15 6 | 7 6 | 9 0 | 8 0 | 9 6 | 7 6 | 11 6 | 9 6 | 1 0 | 0 6 | 0 5 | 2 0 | 1 3 | 10 10 0 | 15 0 | *2 10 0 |
| Beaufort West ... | 13 0 | 17 6 | 12 6 | 6 6 | 8 0 | 11 0 | 7 6 | 4 6 | 6 0 | 12 0 | 1 0 | 0 4 | 0 5½ | 1 4½ | 1 0 | 13 0 0 | 14 0 | 5 0 0 |
| Capetown ... | 11 0 | — | — | 6 0 | — | 8 0 | 6 0 | 4 0 | 5 3 | 8 0 | ‡0 6 | — | — | 1 4 | 1 3 | — | — | — |
| East London ... | 9 0 | 18 0 | 29 0 | 5 6 | 14 0 | 4 0 | 8 0 | 5 6 | 4 6 | 13 6 | 1 0 | 0 5 | 0 6 | 1 8 | 2 2 | 11 0 0 | 17 0 | 1 7 0 |
| Grahamstown ... | 11 0 | — | — | 6 6 | — | 5 6 | 7 6 | 5 6 | 2 9 | 8 6 | 0 9¾ | 0 6 | 0 6 | 1 9½ | 1 4½ | — | — | — |
| Kimberley ... | 12 0 | 16 0 | 14 0 | 5 0 | 6 6 | 8 6 | 6 6 | 5 0 | 4 6 | 12 0 | 0 7 | 0 6 | 0 5 | 1 3 | 1 6 | 15 0 0 | 16 0 | 4d. p. lb. |
| Kingwilliamstown | 8 6 | 18 0 | 13 6 | 5 0 | 6 9 | 7 0 | 8 0 | 3 0 | 3 0 | 6 6 | 0 9 | 0 6 | 0 6 | 1 6 | 1 2 | 13 10 0 | 20 0 | §3d. " |
| Port Elizabeth ... | 10 0 | — | — | 6 6 | — | 6 6 | 7 0 | 6 0 | — | 9 0 | — | 0 8 | 0 8 | 1 6 | 1 5 | — | — | 2 10 0 |
| Queenstown ... | 11 0 | — | — | 5 6 | 8 0 | 8 6 | 9 0 | 4 0 | 4 6 | — | — | — | — | 1 0 | 1 3 | — | — | — |
| *Natal:* | | | | | | | | | | | | | | | | | | |
| Durban ... | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Pietermaritzburg | 12 0 | — | — | 5 3 | — | 12 0 | 6 0 | 4 0 | 5 3 | 10 0 | 0 4 | 0 5 | 0 6½ | 1 2 | 1 2 | — | — | — |
| *Transvaal:* | | | | | | | | | | | | | | | | | | |
| Pretoria ... | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Johannesburg ... | 11 9 | — | 12 6† | 4 4 | 3 9 | 8 0 | 7 1 | 4 6 | 4 3 | 10 5 | 0 2½ | — | — | 1 2 | 1 0 | — | — | — |
| *Orange Free State:* | | | | | | | | | | | | | | | | | | |
| Bloemfontein ... | 25 0 | — | 32 6 | 9 0 | 12 6 | — | 7 0 | 4 9 | 6 0 | 10 0 | 0 6 | 0 7 | 0 6 | 1 6 | 0 10 | — | — | — |
| Harrismith ... | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

* Average, £2 to £3. † Sifted. ‡ Average 4d. to 8d. § Live weight.

# Farm Employment.

**NOTE.—*This section is open to persons desiring to obtain employment on the land, and to farmers who require farm assistants. Notices are inserted in several succeeding issues; and advertisers are requested to advise the Editor as soon as their requirements are filled in order that their notices may be deleted.***

SITUATIONS WANTED.

Applicant, age 38, married, with six children, two eldest boys 14 and 15, desires position on farm or estate. Experienced in carpentry, wire work, fencing, upkeep of telephones and erection of lines. Good kit of tools. Used to supervising Kaffir and Indian labour. Twelve years' successful experience in poultry rearing.—C.A.T., 276 Bulwer Road, Durban. [9]

Active, well-educated young man, seeks appointment on agricultural and stock farm as learner. Not afraid of work. Can be useful in many ways besides farming.—ROSE, c/o Rayton Co-operative Store, Rayton, near Pretoria. [11]

Applicant, married, desires situation as farm manager, by up-to-date and experienced farmer, including the management of ostriches and cultivation of lucerne, agriculture in all branches, and all branches of stock farming.—"OXO," *Journal* Office, Pretoria. [11]

Wanted by a handy-man, age 40, married, fairly well educated, any position on a farm. Not afraid of work. Small salary, with piece of ground to work for himself, where there is a small house preferred. Natal Province.—MICK, c/o Mr. A. E. Nolan, P.O. Dundee. [11]

Energetic young man, 23 years of age, undergraduate Cape University, competent book-keeper and secretary, seeks employment on farm where he can acquire practical farming knowledge. Best testimonials.—C.J.R., Box 1599, Johannesburg. [11]

Applicant, age 40, single, would like employment on farm. Ploughman, with knowledge of general farm work. Can do repairs such as blacksmithing, shoeing, wood-work, wagons, etc., also could drive steam or motor plough, including necessary repairs. Would go shares in mealie farming (or otherwise) with object of settling in South Africa.—R. HESELTINE, Box 97, Pilgrims Rest. [11]

Applicant, age 30, single, desires a situation as working manager or foreman on a fruit farm. Fifteen years' practical experience in pruning, grafting, budding, and laying out of orchards of citrus and deciduous fruits. Specially trained in packing of same for export or local trades, for which first prize was awarded at Grahamstown Show. Excellent references can be given.—S.S. Box 3036, Johannesburg. [11]

Situation wanted on farm by husband and wife. Former has had experience in farming in other countries; is also prepared to teach book-keeping. Latter can take charge of school or pupils, teach French, etc., in addition to ordinary school curriculum.—V. A. W., *Agricultural Journal* Office, Pretoria. [11]

South African, age 56, unmarried and bilingual, desires situation on a farm. Has had a wide experience in farming in South Africa, and is able to handle horses, ostriches, and live stock generally, and altogether to oversee the many duties to be carried out on a farm.—M. H. GREEFF, Poste Restante, Capetown. [11]

South African, age 25, seeks employment as farm manager. Holds diploma of Potchefstroom School of Agriculture. Not afraid of hard work. Willing to work for salary, or on share and salary basis.—H.M., Box 2664, Johannesburg. [11]

Student at Elsenburg Agricultural College (Cape), age 21 years, completing full course in December, desires suitable employment on a dairy and fruit farm, or on a general farm by preference. Has matriculated; speaks English and Dutch; and has good references.—B. B. HEWAT, Elsenburg, Mulders Vlei, C.P. [11]

Single man, British, aged 33, with good education, seeks position with established farmer. Small salary or other suitable arrangement. Two years' general experience.—J. PACKMAN, Central Hotel, Vryburg. [11]

Young Colonial, age 20, healthy and strong, is desirous of getting on a farm up-country—Eastern Province or O.F.S. preferred—to learn cattle, sheep, and general farming. Speaks Dutch.—DONALD H. R. LYON, P.O. Constantia, C.P. [11]

German, age 21, single, who has had one year's training on the Agricultural Experiment Station at Bremen, Germany, and other farming experience, especially in connection with the management of cattle, is anxious to obtain employment on a farm in the Union.—JOH. CREMER, "Penarth," St. John's Road, Sea Point, C.P.

Experienced stock farmer, with knowledge of agricultural implements and machinery and tree planting, aged 30 years, married (no children), desires situation at £8 per month, to be increased later if his work proves satisfactory. Testimonials.—W. F. JOUBERT, Rooikop, P.O. Leeuwklip, Middelburg, Transvaal. [12]

Applicant, married, age 36, is anxious to obtain employment in the capacity of overseer or manager of a farm. Has had 16 years' experience of South African farming and has a thorough knowledge of all branches of farming, including ostriches and lucerne cultivation. Is specially qualified to take charge of cattle and horses, particularly for stud purposes. Possesses a practical knowledge of veterinary matters and the treatment of animals. Speaks Dutch. Terms to be arranged.—J. H. LYNCH, Poste Restante, Capetown. [12]

Applicant, British, seeks employment with a well-to-do bachelor or as cook and housekeeper. Steady, energetic, and thoroughly reliable. Can make bread, butter, jam, hams, etc. Handy-man. Easy terms. At present employed by the month.—R. L. JOHNSTONE, Poste Restante, Kestell. [12]

Applicant, about 22 years of age, Dutch, nurseryman, seeks employment. Can graft and bud. Testimonials.—A.V., 60 Skinner Street, Pretoria. [12]

Applicant, English, age 20, seeks employment on a dairy farm as manager or assistant manager. Has had a thorough experience of dairying in England, and has also handled cattle and horses in Canada. If possible, would prefer employment in the Western Province, but is prepared to go elsewhere. Terms to be arranged.—J. F. DODD, c/o C. B. Martin, "Rathfriland," Lochiel Road, Rondebosch, Cape. [12]

Position wanted by South African lad (17) as learner on farm (mixed farming). Healthy and willing.—"L," c/o O. Howzel, Steynsburg, C.P. [12]

Educated young man, 20, matriculated, desires position as learner on farm. Speaks English and Dutch. Northern Transvaal or Natal preferred.—J.D.L., P.O. Box 458, Johannesburg. [12]

## SITUATIONS VACANT.

The South African National Union have a number of applications from farmers in different parts of the Union who offer to take pupils on the condition that they are willing to serve a term of apprenticeship in exchange for board and lodging and instruction, with the prospect of a wage or interest afterwards. Young men who will go on to the land on these terms are invited to communicate with the Secretary, 20 Cullinan Buildings, Johannesburg. [9]

Wanted a practical man (single) to take over lands on shares, oxen and implements supplied, but not labour.—X.Y.Z., c/o Boyce & Co., Zeerust. [11]

Uncultivated piece of land offered to a person who is prepared to work it on his own account. Plenty of water. Suitable for early gardening. Five miles from market. Also another farm suitable for dry-land farming. Terms to be agreed upon.—P. F. TRICHARDT, Waterkloof, P.O. Rustenburg. [11]

Assistant required on a general farm. Testimonials wanted. Payment of 10 per cent. of all harvests, viz., cereal and stock. Board and lodging free. Write for further information to C. J. v. D. WESTHUIZEN, Vaalkrantz, P.O. Paardekraal, via Roodewal Station. [11]

Wanted at once an active young man as general assistant on a farm, about 12 miles from Pretoria. Terms: Share of harvest. For further information address "C.S.," c/o *Agricultural Journal*. [12]

Wanted a young man—not necessarily experienced—on a small farm. Must be trustworthy. Owner is often away from home, when he must manage. £1 per month with free board and lodging.—M. J. VAN ZIJL, Klipplaat, P.O. Rheboksfontein, Venterstad, C.P. [12]

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A.H.G. (Bloemhof).—You failed to enclose your full name, and a reply could not therefore be sent you by post. Only farm employment notices are inserted in these pages gratis. You should, if you wish to advertise otherwise in the *Journal*, communicate with the Metropolitan Advertising Co., Capetown.

# Departmental Notices.

ORGANIZATION OF DEPARTMENT OF AGRICULTURE.

Administrative Office ... ... Pretoria.
Telegraph Address ... ... "Landbouw, Pretoria."

Secretary for Agriculture : F. B. Smith. Under-Secretaries for Agriculture : P. J. du Toit and A. Holm. Deputy-Accounting Officer : J. Collie. Chief Clerk : G. N. Williams. Officer in Charge of Inquiry Office, Capetown : G. W. Klerck.

VETERINARY DIVISION.

This Division endeavours to prevent the introduction of contagious diseases of live stock into the Union and to eradicate such as are already present, and to protect live stock against enzootic diseases by inoculation and other means. So far as it is able to do so without interfering with its other duties, the Division advises and assists farmers upon diseases of stock generally and endeavours to enlighten them upon veterinary hygiene and the care of live stock. For veterinary purposes the Union is divided into five areas, each in charge of Senior Veterinary Officers, who are responsible for the control of disease within these areas.

Principal Veterinary Officer : C. E. Gray. Assistant Principal Veterinary Officer : J. D. Borthwick.

*Cape Province.*—Senior Veterinary Surgeon : R. W. Dixon, Government Offices, Parliament Street, Capetown. Government Veterinary Surgeons : A. Goodall, Capetown; W. Jowett, Capetown; E. Fern, Capetown ; R. P. Jones, East London ; J. H. L. Lyons, East London ; W. P. Hamlyn, East London ; A. Mathew, Elliot ; W. A. Simson, Cradock ; W. Jones, Uitenhage ; J. Nichol, Kingwilliamstown ; W. G. Pakeman, Queenstown ; J. P. L. Goemans, Vryburg.

*Transvaal.*—Senior Veterinary Surgeon : J. M. Christy, Department of Agriculture, Pretoria. Government Veterinary Surgeons : R. S. Garraway, Pretoria ; W. G. Evans, Box 80, Volksrust ; P. Conacher, Box 877, Johannesburg ; J. I. Edgar, Pietersburg ; G. May, Box 151, Rustenburg ; H. M. Webb, Carolina ; G. C. Webster, Box 94, Barberton ; J. Chalmers, Box 31, Ermelo ; J. M. Tate, Standerton ; J. G. Bush, Box 83, Krugersdorp ; G. Lee, Box 93, Middelburg ; T. M. Dale, Box 230, Potchefstroom ; F. Dunning, Box 53, Lydenburg ; G. McCall, Box 15, Nylstroom ; D. B. J. McCall, Box 51, Zeerust.

*Natal.*—Senior Veterinary Surgeon : W. M. Power, Colonial Buildings, Pietermaritzburg. Government Veterinary Surgeons : S. H. Ewing, Eshowe ; A. F. Harber, Box 39, Point, Durban ; S. I. Johnston, Mooi River ; F. J. Hill, Ladysmith ; A. Goule, Maritzburg ; J. L. Webb, Bulwer ; C. Tyler, Port Shepstone ; and F. Hutchinson, Dundee.

*Orange Free State.*—Acting Senior Veterinary Surgeon : G. W. Freer, Government Buildings, Bloemfontein. Government Veterinary Surgeons : J. F. Joyce, Ficksburg ; J. R. R. Hamilton, Bloemfontein ; F. M. Skues, Bethlehem ; C. H. Wadlow, Smithfield ; and C. T. Clemow, Frankfort.

*Transkeian Territories.*—Senior Veterinary Surgeon : J. Spreull, Umtata. Government Veterinary Surgeons : A. M. Howie, c/o S.V.S., Umtata ; A. C. Kirkpatrick, T. M. Doyle W. A. Dykins, J. J. G. Keppel, G. T. Henderson, and J. A. Worsley, Umtata.

DIVISION OF VETERINARY RESEARCH.

The duty of this Division is the investigation diseases of live stock with a view to discovering methods of eradicating them or of protecting animals against them. It examines and reports upon pathological specimens forwarded by the Veterinary Division and farmers and prepares vaccines and sera of various kinds, and also mallein, tuberculin, and other diagnostic and preventive agents.

Opportunities are offered to post-graduate students for the carrying out of special investigations and a great deal of educational work is performed by the Division.

The Division is in close touch with and is complementary to the Veterinary Division. Director of Veterinary Research : Dr. A. Theiler. Assistant Director of Veterinary Research : W. Robertson. Superintendent : E. Parkes. Professional Assistants : D. T. Mitchell, W. H. Andrews, D. Kehoe, F. Veglia, W. Jowett, G. N. Hall, G. A. H. Bedford, A. W. Shilston (Pietermaritzburg), and J. Walker (Grahamstown).

### DIVISION OF SHEEP.

This office is charged with :—(*a*) Eradication of scab ; (*b*) improvement of pastora ndustries ; (*c*) the management of the Stud Sheep Farm at Ermelo ; (*d*) the improvement of the flocks maintained on the various Experimental Farms ; and (*e*) the control of the Field Cornets in the Transvaal Province.

Chief of Division : B. G. L. Enslin. Principal Sheep Inspector : A. G. Davison. Principal Sheep and Wool Expert : Charles Mallinson.

For the better carrying out of the work in connection with scab, the Union is divided into twenty-four areas in charge of Senior Sheep Inspectors ; these areas are in turn divided into 297 inspection districts, each in charge of an Inspector. In addition there are ten Inspectors employed on the railway lines for the prevention of the movement of infected stock by rail. There are also five whole-time Inspectors employed on certain large commonages.

A similar organization is adopted in respect of the improvement of sheep and wool.

*Orange Free State Province.*—Sheep and Wool Expert : J. F. McNab, Bloemfontein. Assistant Sheep and Wool Expert : A. V. M. Suter, Bloemfontein.

*Cape Province.*—Sheep and Wool Expert : W. M. McKee, Queenstown. Assistant Sheep and Wool Experts : E. V. Goddefroy, Worcester ; P. S. Taylor, Steynsburg.

*Transvaal Province.*—Western District Assistant Sheep and Wool Expert : A. M. Spies, Headquarters not yet fixed. Eastern District Assistant Sheep and Wool Expert : J. J. McCall, Cedara, Natal.

*Natal Province.*—Assistant Sheep and Wool Expert : J. J. McCall, Cedara, Natal. This area includes the East Griqualand District of the Cape Province.

Manager, Ermelo Stud Sheep Farm : A. G. Michaelian.

### DIVISION OF ENTOMOLOGY.

This Division obtains and disseminates information relative to beneficial and injurious "insects." In collaboration with the Division of Plant Pathology, it administers the law relating to the introduction of plants into the Union and by the inspection of nurseries and other methods, it endeavours to control injurious "insects" present in the Union ; it is also responsible for the destruction of locusts.

Chief of Division : C. P. Lounsbury. Entomologists : Claude Fuller and C. P. v. d. Merwe, Pretoria ; C. W. Malley, Capetown ; ......................................, Bloemfontein ; and C. B. Hardenberg, New Hanover, Natal (investigating wattle insects).

### DIVISION OF PLANT PATHOLOGY AND MYCOLOGY.

This Division in engaged in the investigation and control of diseases of plants, produced by fungous and physiological causes, and the study and collection of fungi of economic importance. The Division is also concerned with the investigation of the merits of indigenous plants of economic importance and of poisonous plants and noxious weeds, the identification of plants, the introduction and testing of economic plants from abroad and the improvement of farm crops by breeding.

Chief of Division : I. B. Pole Evans. Director, Natal Herbarium : J. Medley Wood. Professional Assistants : Miss E. M. Doidge, P. A. v. d. Byl, Miss A. Bottomley, and Miss M. Franks. Herbarium Assistant : Miss C. Stent.

### DIVISION OF TOBACCO AND COTTON.

The object of this Division is the promotion of the tobacco and cotton industries. Experiments are conducted in the breeding and growth of tobacco and cotton and in the curing, fermentation, and preparation of tobacco for the market. Approved varieties of tobacco and cotton seed are distributed amongst farmers and advice given to them person ally and by correspondence and publications.

Chief of Division : W. H. Scherffius. Tobacco Warehouse Expert: T. E. Elgin. Expert for Turkish tobacco, Western Province, Cape : L. M. Stella, Stellenbosch. Manager Experiment Station, Rustenburg : H. W. Taylor. Manager, Experiment Station, Barberton . W. B. Wilson. Manager, Tzaneen Estate : E. H. T. Powell. Manager, Experiment Station, Piet Retief : R. T. Falgate.

### DIVISION OF DAIRYING.

This Division deals with all matters connected with the advancement of dairying. The Division also controls the Cold Stores at Vryburg.

Superintendent of Dairying : E. O. Challis. Senior Inspector : E. G. Hardy. Instructors : *Cape Province :* C. Schmoike, Queenstown. *Orange Free State.*—W. Oosterlaak, Government Buildings, Bloemfontein. *Natal.*—......................., Colonial Office, Pietermaritzburg. *Transvaal.*—L. J. Veenstra and E. G. Zahn, Department of Agriculture, Pretoria.

## DIVISION OF HORTICULTURE.

This Division advises farmers on the growing and marketing and export of fruit,

Chief of Division: R. A. Davis. Horticulturist in charge of Experiment Station Warmbaths: C. A. Simmonds. Horticulturist in charge of Experiment Station, Ermelo: R. le Sueur. Instructor in Horticulture, Cape Province: S. W. van Niekerk, Bovenvallei, Wellington.

## DIVISION OF VITICULTURE.

This Division is charged with the duty of advising farmers in all matters relating to the culture of the vine (excluding table grapes and raisin-making) and the manufacture of wine and brandy, and vinegar. It conducts field investigations into the suitability of various stocks, the use of fertilizers, modes of cultivation, etc., and investigates the diseases of the vine, and conducts both cellar and laboratory experiments in the making of wine and brandy. It examines pathological specimens and furnishes reports thereon, and examines chemically and bacteriologically specimens of the products above mentioned with a view to furnishing advice thereon to farmers.

This Division also includes the Government Wine Farm, Groot Constantia, where advice can be obtained by residents in the Wynberg and Hout Bay areas.

Government Viticulturist: A. I. Perold, Œnological Station, Paarl, Cape Province. Manager, Government Wine Farm, Groot Constantia: T. L. Watermeyer.

## OFFICE OF GUANO ISLANDS.

This office undertakes the conservation, collection, shipment, and sale to the public of the guano, seal skins, etc., obtained on the various islands belonging to the Union, and is charged with the administration of all matters connected therewith.

Superintendent: W. R. R. Zeederberg, 69 Strand Street, Capetown.

## DIVISION OF CO-OPERATION.

This Division is engaged in promoting co-operation for the sale and purchase of agricultural products and necessities amongst farmers and in organizing and supervising co-operative societies.

Chief Inspector: C. H. Keet. Inspectors: J. Retief and H. Minnaar.

## DIVISION OF CHEMISTRY.

This Division investigates problems of general or special importance, and for the present undertakes the analysis of soils, manures, and foodstuffs for farmers in the Transvaal, the analysis of similar matters in the other Provinces being undertaken in the laboratories of the Department of the Interior at Capetown, Grahamstown, Cedara, and Bloemfontein pending the enlargement of the chemical laboratories at the agricultural schools and experiment stations.

The analyses are conducted solely for the enlightenment of the farmers and not for legal purposes.

Chemist: H. J. Vipond. Laboratory Assistant: L. Bischoff.

## DIVISION OF FENCING AND BRANDS.

This Division administers the laws relating to fencing and brands, and publishes the Brands Directory, required by the Transvaal Act.

Controller of Fencing and Registrar of Brands: W. J. Nussey.

## OFFICE OF HOUSEHOLD SCIENCE.

The duties of this office are to promote the study of household science by means of lectures, demonstrations, and correspondence.

Lecturer and Instructor: Miss J. C. van Duyn.

## DIVISION OF DRY-LAND FARMING.

This Division conducts experiments and disseminates information on dry-land farming. An Experiment Station is maintained at Lichtenburg, with subsidiary ones at Pretoria, Warmbaths, and Pietersburg. Experiments in dry-farming are also conducted at the agricultural schools and experiment stations, and at other centres.

Dry-land Agronomist and Manager, Experiment Station, Lichtenburg: H. S. du Toit.

## DIVISION OF GRAIN INSPECTION.

This Division undertakes the grading of grain at the ports prior to export, and, if requested to do so, determines the amount of moisture present in grain intended for export.

Chief Inspector of Grain: G. F. Nussey. Government graders are stationed at the docks at Capetown, Port Elizabeth, East London, and Durban.

### DIVISION OF PUBLICATIONS.

This Division edits the *Agricultural Journal* and other departmental publications.
Editor: Dr. W. Macdonald.

### LIBRARY.

The object of the Library is to provide as complete a collection of agricultural literature as possible for the purpose of reference.
Librarian: P. Ribbink.

### AGRICULTURAL SCHOOLS AND EXPERIMENT STATIONS.

The duties of these institutions are to provide complete courses of education extending over a period of two years and shorter courses of a technical character for persons actually engaged in farming; to instruct farmers in the area served by them on matters relating to the various phases of farming by means of personal visits, lectures, demonstrations, and correspondence; to conduct experiments, to analyse soils, manures, dairy products, etc., and to identify plants and insects and test seeds. A certain amount of pure-bred stock and of new and approved varieties of seeds are produced on the farms and disposed of to the public.

The institutions do not undertake the administration of laws relating to agriculture.

*Elsenburg School of Agriculture and Experiment Station.*—Station: Mulders Vlei; distance, 1½ miles.

| | |
|---|---|
| Principal | Dr. A. I. Perold. |
| Lecturer in Veterinary Science | R. Painc. |
| „ Horticulture | I. Tribolet. |
| „ Viticulture and Wine-making | S. W. van Niekerk. |
| „ Chemistry | D. C. Crawford. |
| „ Engineering | N. H. Chandler. |
| „ Botany and Plant Breeding | J. H. Neethling. |
| „ Dairying | J. Allison. |
| „ Agriculture and Stock, Agricultural Economics, and Book-keeping | P. Fowlie. |
| „ Geology | The Principal. |
| „ Entomology and Zoology | Dr. Goddard and H. O. S. Reinecke. |
| „ Poultry | W. O. John. |
| „ Carpentry | N. Johnstone. |
| „ Mechanics | A. Ware. |
| Farm Manager | C. J. Starke. |
| Stockman | G. W. Johnston. |

Sub-stations at Malmesbury (E. A. Darvall, Manager), and Robertson (W. H. Fouche Acting Manager).

*Grootfontein School of Agriculture and Experiment Station.*—Station: Middelburg, Cape Province; distance, 2 miles.

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|---|---|
| Principal | R. W. Thornton. |
| Lecturer in Agriculture | G. J. Bosman. |
| „ Veterinary Science | J. A. Robinson. |
| „ Engineering | J. Lees. |
| „ Chemistry | Vacant. |
| „ „ (Assistant) | M. Lundie. |
| „ Zoology and Entomology | R. O. Wahl. |
| „ Dairying | J. Anderson. |
| „ Sheep and Goats | E. N. S. Warren. |
| „ Poultry | A. Little. |
| „ Horticulture | H. B. Terry. |
| „ Farm Manager | C. P. van der Merwe. |

Agricultural Assistants: J. Meldal Johnson, Humansdorp; A. E. Mills and W. J. Lamont, Grootfontein; and H. A. Melle, Vryburg.

*Cedara School of Agriculture and Experiment Station.*—Station: Cedara, on farm; sub-station at Winklespruit.

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| Principal | E. Harrison. |
| Vice-Principal and Lecturer in Agriculture | J. Fisher. |
| Lecturer in Chemistry | C. Williams. |
| „ Veterinary Science | F. J. Carless. |
| „ Dairying and Poultry | A. Laurence. |

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| Lecturer in Horticulture ... ... ... ... | ... C. B. Parsons. |
| „ Engineering ... ... ... ... | ... P. B. Aird. |
| „ Botany and Forestry ... ... ... | ... E. Baker. |
| Farm Manager ... ... ... ... ... ... | ... A. Ireland. |

*Potchefstroom School of Agriculture and Experiment Station.*—Station: Potchefstroom; distance, 1½ miles.

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| Principal... ... ... ... ... ... ... | ... E. J. Macmillan. |
| Vice-Principal ... ... ... ... ... ... | ... H. Thompson. |
| Lecturer in Chemistry ... ... ... ... ... | ... T. G. Reinecke. |
| „ „ (Assistant) ... ... ... | ... C. Douglas-Golding. |
| „ Botany ... ... ... ... ... | ... T. O. Bell. |
| „ Zoology and Entomology... ... ... | ... Vacant. |
| „ Veterinary Science ... ... ... | ... J. R. Quinlan. |
| „ Engineering ... ... ... ... | ... W. S. H. Cleghorne. |
| „ Poultry ... ... ... ... ... | ... R. Bourlay. |
| „ Horticulture ... ... ... ... | ... W. Sturm. |
| „ Dairying ... ... ... ... ... | ... J. B. Fisher. |
| „ Agriculture ... ... ... ... | ... A. M. Bosman. |
| Farm Manager ... ... ... ... ... ... | ... P. A. Hayman. |

## STUD FARMS.

At these farms pure-bred animals, mainly horses, are maintained and bred for lease and sale to farmers.

*Standerton Stud Farm.*—Station: Standerton; distance, 11 miles. General Manager: A. McNae.

*Tweespruit Stud Farm.*—Station: Tweespruit, on farm. Manager: J. J. Morton.